

Argentina

Instituto Argentino de Radioastronomía (IAR-CONICET)

Address: C.C. No.5, 1876 Villa Elisa, Pcia. Buenos Aires, Argentina. **Phone:** (+54 21) 254 909; 870230;

Fax: (+54 21) 254 909; **E-mail:** bajaja@irma.edu.ar.

Director/Head: Esteban Bajaja.

Number of Research Scientists: 25; **Number of Staff:** 16.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Scientific research: HI distribution and kinematics in the Galaxy, in the Magellanic Clouds and in other nearby galaxies. Study of the OH in the Galaxy. High Velocity Clouds (HVCs). HII Regions, Bubbles, Shells and Supershells. Galactic and extragalactic continuum at 21 cm. Technological developments: Very low noise amplifiers, autocorrelators, image processing.

Major Scientific Results or Products: Complete HI survey of Southern Hemisphere below -25° (declination), with angular resolution of 0.5° and velocity resolution of 1 km/s, on grid with 0.5° spacing; complete continuum survey, at 21 cm, of Southern Hemisphere; bubbles in HI around WR stars; variability of continuum sources.

Main Research Facilities Available: Two 30 m equatorially mounted parabolic dishes, each with front-end receiver in primary focus—one of receivers, for 21 and 18 cm, cooled with Hc, is used for HI and OH observations; other works at room temperature and is used for observation of continuum at 21 cm and for SETI experiments; HI and OII spectra obtained with autocorrelator for 1008 channels; rest of facilities consist basically of computers for reduction of observational results and technical instruments for development of electronic equipment.

Future Development Plans: Construction of correlation interferometer for 21 cm, similar to DRAO synthesis telescope; would consist of several (4 to 8) parabolic dishes, with diameter of about 8 m, installed along East-West line, 1 km long.

Cooperation Arrangements with Developing Countries: Brazil, Chile and Mexico; cooperates with Paraguay for installation in Asunción of small radiotelescope.

Other International Cooperation Arrangements: Max-Planck Institut für Radioastronomie, Bonn, Germany.

Universidad de Buenos Aires — Facultad de Ciencias Exactas y Naturales, Departamento de Física

Address: Ciudad Universitaria, PAB 1, 1428 Buenos Aires, Argentina. **Phone:** (+54 1) 782 1007; **Fax:** (+54 1) 7827647; **E-mail:** dussel@dfuba.df.uba.ar.

Director/Head: Guillermo Dussel.

Number of Research Scientists: 120; **Number of Staff:** 18.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Condensed Matter, classical and quantum optics, dynamical systems, general relativity, geophysics, low temperature physics, molecular physics, plasma physics, nuclear physics, particle physics; and quantum field theory.

Major Scientific Results or Products: Research in theoretical and experimental physics; results published in international journals (approximately 100 articles per year).

Main Research Facilities Available: 7 workstations and approximately 50 PC's; experimental facilities to perform research in classical and quantum optics, dielectric properties, magnetic nuclear resonance, plasma physics, low temperature physics, polymer physics.

International Cooperation Arrangements: National Science Foundation (NSF), USA, British Council and EU.

Universidad Nacional de La Plata — Departamento de Física

Address: Calle 49 y 115, C.C No.67, 1900 La Plata, Argentina. **Phone:** (+54 21) 839061, 246062, 820640; **Fax:** (+54 21) 252006; **E-mail:** root@venus.fisica.unlp.edu.ar.

Director/Head: Horacio A. Falomir.

Number of Research Scientists: 105; **Number of Staff:** 23.

Scientific Fields of Interest: Materials; Physics.

Main Lines of Research and Training Activities: Theoretical particle physics; mathematical physics; theoretical nuclear physics, astrophysics; condensed matter; structural crystallography; hyperfine interactions; molecular physics.

Major Scientific Results or Products: Publications in major international journals (about 100 per year).

Main Research Facilities Available: Mössbauer spectrometers; time differential perturbed angular correlation equipment; automatic single crystal and powder X-ray diffractometers; 7 workstations, 60 PC's; library with major publications.

Future Development Plans: Incorporate new experimental facilities, including magnetic susceptometers, DTA-DTG, ion implantator, light scattering equipment for condensed matter research.

Cooperation Arrangements with Developing Countries: Agreements with Chile and Brazil supported by Research Councils, Universities; exchange visitors with those countries; collaborative work resulting in joint publications and development of new fields or research.

Other International Cooperation Arrangements: Collaboration with France (through Centre de la Recherche Scientifique-National Council of Scientific and Technical Research, CONICET); USA (through NSF-CONICET), Italy (through Instituto Nazionale di Fisica Nucleare (INFN) and Germany (through von Humboldt Foundation).

Bangladesh

Dhaka University — Physics Department

Address: Curzon Hall, Dhaka, Bangladesh. **Phone:** (+880 2) 505163-65, 211; **Fax:** (+880 2) 865583.

Director/Head: K.H.M. Mannan.

Number of Research Scientists: ~30; **Number of Staff:** 24.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: High temperature superconductivity and experimental solid state physics; polymer physics; laser physics (limited scope); high energy theoretical physics; solid state (theoretical) physics; geophysics; medical physics; meteorology; nuclear physics (film).

Major Scientific Results or Products: About 34-36 research papers published in national and international journals each year.

Main Research Facilities Available: Microcomputers (IBM compatible PC/AT etc.); IBM mainframe; measuring equipment; library.

Future Development Plans: Develop laser laboratory, polymer physics laboratory, and High T_c laboratory.

International Cooperation Arrangements: HTC Laboratory with Sweden; polymer physics laboratory; Royal Military College, Shrivenham, England (June 1993-1995).

University of Chittagong — Research Centre for Mathematical and Physical Sciences (RCMPS)

Address: Chittagong, Bangladesh. **Phone:** (+880 31) 682031-40 ext. 4330; **Fax:** (+880 31) 682030.

Director/Head: Jamal Nazrul Islam.

Number of Research Scientists: ~ 20; **Number of Staff:** 8.

Scientific Fields of Interest: Theoretical Chemistry; Mathematics; Physics/Astronomy; Statistics; Logic philosophy of science (physical).

Main Lines of Research and Training Activities: Mathematical and theoretical physics (e.g. quantum field theory, general relativity, theoretical solid state physics, cosmology); fluid dynamics (including ocean-atmosphere dynamics); chemical physics; foundations and philosophy of mathematics and logic and physical sciences generally; mathematical economics; statistics (nonlinear programming). Regular conferences held on mathematical physics, chemical physics; biomathematics, biophysics, biostatistics, mathematical economics, foundations and philosophy of mathematical and physical sciences.

Major Scientific Results or Products: Between 5 and 10 papers published in international journals, about a dozen papers in preparation; 2 PhD and 7 MPhil (Master of Philosophy) degrees; 6 PhD theses submitted.

Main Research Facilities Available: Library; microcomputer; own building and premises with lecture rooms and auditorium; overhead and slide projector.

Future Development Plans: Improve quality and consolidate all activities listed above.

Cooperation Arrangements with Developing Countries: Trying to have speakers and participants from neighbouring countries (and beyond) at its conferences.

Other International Cooperation Arrangements: Affiliated Centre (ICAC) of International Centre for Theoretical Physics (ICTP), Trieste, Italy (1994 last of five years).

Brazil

Centro Brasileiro de Pesquisas Físicas (CBPF)

Address: Rua Xavier Sigaud, 150, 22290-180 Rio de Janeiro, RJ, Brazil. **Phone:** (+55 21) 2959044; **Telex:** (021) 22563 CBPQ; **Fax:** (+55 21) 5412047; **E-mail:** cbpf@cat.cbpf.br.

Director/Head: Amos Troper.

Number of Research Scientists: 70 ; **Number of Staff:** 200.

Scientific Fields of Interest: Biophysics; Theoretical Chemistry; Physics/Astronomy; Cosmology.

Main Lines of Research and Training Activities: Condensed matter physics (theoretical and experimental): electronic structure, magnetism, superconductivity; statistical physics; cosmology and gravitation; particle physics and field theory; nuclear physics and cosmic rays; high energy physics (experimental and theoretical); biophysics; theoretical chemistry.

Major Scientific Results or Products: Published 140 papers in international journals per year (in past three years), 15 PhD theses and 14 MSc theses in 1996; from creation of graduate courses in 1965 to now: 375 theses (236 MSc theses and 160 PhD theses).

Main Research Facilities Available: Solid state laboratories: NMR, ENDOR, EPR, Mössbauer, magnetometry, resistivity, X-rays; Electron accelerator of 4 MeV; Computer network and parallel computing facilities; one of the best libraries in physics in Latin America.

Future Development Plans: Molecular beam epitaxy facility; nanoscopy laboratory (force and tunnelling microscopes).

Cooperation Arrangements with Developing Countries: Latin American Centre for Physics (CLAF) is located, by intergovernmental agreement, at CBPF. Through CLAF, CBPF is linked to all Latin American research institutes and universities. In 1992, National Research Council (CNPq) signed an agreement with CLAF providing 20 fellowships at CBPF for students from other Latin American countries (10 PhD + 10 postdoctoral positions).

Other International Cooperation Arrangements: International collaboration in experimental high energy physics with CERN (Switzerland) and FERMILAB (USA).

Observatório Nacional, Conselho Nacional de Desenvolvimento Científico e Tecnológico, Ministério da Ciência e Tecnologia (ON/CNPq/MCT)

Address: Rua General Bruce, 586, São Cristóvão, 20921-030, Rio de Janeiro, RJ, Brazil. **Phone:** (+55 21) 580-6087; **Telex:** 02121288; **Fax:** (+55 21) 580-6041; **E-mail:** sayd@on.br.

Director/Head: Sayd José Codina Landaberry.

Number of Research Scientists: 43; **Number of Staff:** 137.

Scientific Fields of Interest: Earth Sciences; Physics/Astronomy.

Main Lines of Research and Training Activities: Astronomy and astrophysics: Astrometry and celestial mechanics; Stellar and interstellar medium astrophysics; Extragalactic astrophysics; Cosmology. Geophysics: Geomagnetism; Gravimetry; Seismology.

Major Scientific Results or Products: Scientific papers in international journals; astronomical ephemeris; Brazilian geomagnetic and geogravimetric survey; legal time service.

Main Research Facilities Available: Library on astronomy, physics and geophysics with 13,400 books and 110 journal collections; peripheral equipment used in national astrophysics laboratory; geomagnetic observatories and seismologic stations; 22 Sun workstations and 44 OC computers connected to IBM comp. of National Laboratory of Scientific Computing.

Future Development Plans: Economic situation prevents any development during next three years.

Cooperation Arrangements with Developing Countries: Centre for Astrophysics, Harvard Observatory; ORSTOM, France; Observatório Astronômico "El Leoncito", Argentina; Observatoire de la Côte d'Azur.

Pontifícia Universidade Católica do Rio de Janeiro — Departamento de Física

Address: Rua Marques de São Vicente 225, Gavea, Caixa Postal 38071, Rio de Janeiro 22452 RJ, Brazil. **Phone:** (+55 21) 5299353; **Fax:** (+55 21) 5123222; **E-mail:** enio@fis.puc-rio.br.

Director/Head: Enio F. da Silveira.

Number of Research Scientists: 30; **Number of Staff:** 28.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Atomic physics: collision with meV ions; large molecule mass spectrometry: LIMS, MALDI, PDMS. Material Science: thin films, hard coating. Ap. Physics: magnetism, low temperature, biophysics. Solid state theory; elementary particle theory.

Major Scientific Results or Products: Large number of international journal publications; mass Spectrometer (time of flight) prototypes. SQUID prototypes.

Main Research Facilities Available: 4 MV Van de Graaff Accelerator; ultra-high vacuum equipment. Atomic force microscope; SQUID, EPR, MALDI, RBs, PIXE; library and mainframe computer.

Future Development Plans: Atomic physics by MeV collisions; surface physics by AES, XPS, UPS, MALDI, SIMS; Solid state theory; field theory; low temperature: SQUID.

International Cooperation Arrangements: Interaction with Argentina, Ecuador, Cuba.

Universidade de São Paulo — Instituto de Física

Address: Caixa Postal 20516, São Paulo, 01498, SP, Brazil. **Phone:** (+55 11) 8186900; **Telex:** 1180923 IFSP BR; **Fax:** (+55 11) 8186907; **E-mail:** marques@if.usp.br.

Director/Head: Gil Da Costa Marques.

Number of Research Scientists: 200; **Number of Staff:** 304.

Scientific Fields of Interest: Energy; Materials; Physics and Astrophysics.

Main Lines of Research and Training Activities: Nuclear physics, materials science, particles and field theory, statistical physics, biophysics, physics teaching, applied physics, energy, plasma physics, optics, atomic and molecular physics.

Major Scientific Results or Products: About 160 original papers per year published in international refereed journals; development of joint projects with high tech industries in the areas of materials, environmental sciences.

Main Research Facilities Available: Linear accelerator, pelletron, electronic microscopes, molecular beam Epitaxy equipment, X-ray diffractometer, Tokamak, magnetometer, computer centre (VAX 3560), library, low temperature physics facility.

Future Development Plans: Implantation of linear accelerator (LINAC) for ions, implantation of a new Tokamak laboratory and enhancement of material science investigation facilities.

International Cooperation Arrangements: Several: USA, most European countries, some countries in Asia (Japan, China).

Universidade de São Paulo — Instituto de Física de São Carlos

Address: Av. Dr. Carlos Botelho, 1465, 13.560-250 São Carlos, SP, Brazil. **Phone:** (+55 162) 749160;

Fax: (+55 162) 722218; **E-mail:** yvonne@ifqsc.sc.usp.br.

Director/Head: Yvonne Primerano Mascarenhas.

Number of Research Scientists: 110; **Number of Staff:** 143.

Scientific Fields of Interest: Biochemistry/Biophysics; Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Biophysics, crystal growth, X-ray diffraction crystallography, Atomic physics, polymeric materials, electronic instrumentation, ceramics, Nonlinear optics, lasers, nuclear magnetic resonance, semiconductors, statistical mechanics, metals, quantum field theory, neuro-networks, science education.

Major Scientific Results or Products: Nuclear magnetic resonance tomograph; trapping of atoms; Langmuir-Blodgett films; semiconductor nanostructures; image process; optical components and equipment; molecular structure determination of proteins and small molecules.

Main Research Facilities Available: FIR-Spectrometer, Bomem MBE equipment; X-ray diffractometers, CAD-4, RAXIS-II and Powder; Langmuir-Blodgett; VAX-6420 vector mainframe computer; 20 workstations; MNR and EPR spectrometers; photon correlator; laser Ar, Kr, ND:Yag; scanning microscope; Czochralski equipment for crystal growth.

Future Development Plans: Create interdisciplinary centre of research and technological development in advanced materials and structural molecular biology to support Brazilian industry and R&D laboratories working in related fields.

Cooperation Arrangements with Developing Countries: Chile, Argentina and Mexico.

Other International Cooperation Arrangements: France, Portugal, USA, Russia, England and Poland.

Universidade Estadual de Campinas (UNICAMP) — Instituto de Física “Gleb Wataghin” (IFGW)

Address: Caixa Postal 6165, 13083-970 Campinas, SP, Brazil. **Phone:** (+55 192) 397150; **Telex:** (019) 1150; **Fax:** (+55 192) 393127; **E-mail:** brito@ifi.unicamp.br.

Director/Head: Carlos Henrique de Brito Cruz.

Number of Research Scientists: 130; **Number of Staff:** 230.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Semiconductor physics; optical communications; superconductivity; amorphous silicon for solar cell; cosmic ray physics; theoretical physics; metals; materials physics.

Major Scientific Results or Products: 220 papers published per year in refereed journals; optical fibre technology; semiconductor optical devices technology.

Main Research Facilities Available: 45 research laboratories; chemical beam epitaxy; computer facility: VAX 4200, SUN 690, IBM 9321, IBM RISC'S, 35 workstations, 280 microcomputers; library with 12,000 books and 322 journal titles.

Cooperation Arrangements with Developing Countries: Argentina and Bolivia.

Universidade Estadual Paulista (UNESP) — Instituto de Física Teórica

Address: Rua Pamplona, 145, 01405-900 São Paulo, SP, Brazil. **Phone:** (+55 11) 251-5155; 251-5765; **Telex:** (+55 11) 19001 UJMF SP; **Fax:** (+55 11) 288-8224; **E-mail:** natale@xpf.ift.unesp.br.

Director/Head: Adriano A. Natale.

Number of Research Scientists: 25 PhDs; **Number of Staff:** 15 supporting staff.

Scientific Fields of Interest: Physics, Astronomy.

Main Lines of Research and Training Activities: Field theory; Elementary particle physics; Nuclear physics; Gravitation and cosmology; Mathematical methods in physics; Nonlinear phenomena; Statistical mechanics.

Major Scientific Results or Products: Scientific papers and MSc and PhD theses.

Main Research Facilities Available: Computers: 1 AXP server, 1 high end server RS6000 IBM, 2 high performance workstations RS6000 IBM, 14 medium performance workstations RS6000 IBM, 15 microcomputers, 12 printers, connected with the ANSP Network. Library: 13,662 books covering areas of

mathematics, physics of elementary particle and fields, nuclear physics, mathematical physics, cosmology and gravitation, condensed matter and atomic physics; subscribe to 215 journal titles (77 complete collections).

Cooperation Arrangements with Developing Countries: Cooperation with Chile and Argentina with CLAF support.

Other International Cooperation Arrangements: ICTP, Trieste; Several American and European institutes and universities.

Universidade Federal de Minas Gerais — Departamento de Física

Address: Instituto de Ciências Exactas, Av. Antonio Carlos 6227, Caixa Postal 702, Belo Horizonte, 30161-960, Minas Gerais, Brazil. **Phone:** (+55 31) 4995620; **Fax:** (+55 31) 4995600.

Director/Head: Oscar N. Mesquita.

Number of Research Scientists: 52 PhD; 6 MSc; **Number of Staff:** 21.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Condensed matter physics: semiconductors, crystal growth (MBE and Bulk), magnetism, optics (Raman, photon correlation, luminescence, quantum optics), phase transitions and critical phenomena (theory and experiments), crystallography, hydrodynamics; Astrophysics; Mathematical physics.

Major Scientific Results or Products: Articles in most of the important journals of the world, in the area of physics and astronomy and materials.

Main Research Facilities Available: MBE and crystal growth facilities; 2 optic laboratories with 2 Raman spectrometers; 3 photon correlation spectrometers; mono-chromators for luminescence; facilities for surface physics with lead, auger, rheed; XPS; STM; AFM; magnetometers; 2 superconductor magnetic field (17 TESLA); facilities for electric transport; liquid helium; machine shop; X-ray facilities; physics library; 20 workstations and 100 microcomputers.

Cooperation Arrangements with Developing Countries: Cooperation programmes with CNPq/INSF and CNPq/France.

Universidade Federal do Rio Grande do Sul — Instituto de Física (IF/UFRGS)

Address: Campus do Vale, Caixa Postal 15051, 91501-970 Porto Alegre, RS, Brazil. **Phone:** (+55 51) 2281633; **Fax:** (+55 51) 3361762; **E-mail:** direcao@ifi.ufrgs.br.

Director/Head: Irene M. Strauch.

Number of Research Scientists: 78; **Number of Staff:** 68.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Astrophysics; science and technology of thin films; research on physics teaching; study of structural and magnetic properties of materials; phenomenology of elementary particles of high energy; physics of high pressure and ceramics; statistical physics: Neural nets, spinglasses, phase transitions and critical phenomena; plasma physics and fluid dynamics; physics of hadrons and leptons; physics of condensed matter; ion implantation of materials; statistical mechanics of non equilibrium; optical properties of materials; quantum field theory; microelectronics; subatomic physics; resistivity laboratory.

Major Scientific Results or Products: Over 100 scientific publications per year in major periodicals of physics and astronomy; development of new materials and scientific instruments; training of high school teachers; industry consultancy.

Main Research Facilities Available: Library: 757 periodicals (247 current), 11,000 books, CD-ROM (Inspect); Computers (VAX4000, 19 workstations 120 PC's); nine research labs with (several experimental setups each); three presses (400-1000 ton); ion implantation machines; thin film facilities; X-ray, vacuum and mechanical shops; cryogenic facilities, Mössbauer spectroscopy; general magnetic research facilities; astronomical observatory (50 cm), W/photoelectric photometer; Na:YAG Laser; scanning tunnelling microscope, ethemet, novel net.

Future Development Plans: Increase cooperation with foreign countries to exchange qualified personnel and increase the activities related to applied physics.

Cooperation Arrangements with Developing Countries: Cooperation agreements individual level with researchers in Argentina, Chile, Venezuela, countries of East Europe and others.

Other International Cooperation Arrangements: Cooperation with many countries, including both official agencies' programmes such as Capes (Brazil), DAAD, (Germany), CNPq (Brazil), NSF (USA) and Capes (Brazil)-COFECUB (France); fraternity agreement between state of Rio Grande do Sul and province of Shiga (Japan); individual interactions usually supported by Brazilian funding agencies.

Chile

Centro de Estudios Científicos de Santiago (CECS)

Address: Presidente Errázuriz 3132, Las Condes, Santiago, Casilla 16443, Santiago 9, Chile. **Phone:** (+56 2) 2338342; 206-0092 **Fax:** (+56 2) 233-8336; **E-mail:** ceecs@ceecs.cl.

Director/Head: Claudio Teitelboim.

Number of Research Scientists: 20; **Number of Staff:** 10.

Scientific Fields of Interest: Biology; Biochemistry/Biophysics; Theoretical Physics.

Main Lines of Research and Training Activities: *Biology:* ion channels, electrophysiology of excitable cells in *Drosophila* neurological mutants; Apamin-sensitive potassium channels; chemical transduction in olfactory neurons; biochemical properties of membranes isolated from skeletal muscle; characterization of skeletal muscle calcium channels; muscle cells in culture. *Microbiology:* immunological response in HIV-1 infected individuals; HIV strains circulating in Chile; cooperation in diagnosis of HIV infection.

Theoretical Physics: classical and quantum gauge field theories, gravitation.

Major Scientific Results or Products: 13 books; 86 papers in biology, 121 in theoretical physics, 16 in microbiology.

Main Research Facilities Available: Large number of items commonly found in biology and microbiology laboratories.

Future Development Plans: Have own laboratory premises; establish permanent international school with faculty and laboratories for graduate training at regional level in fields covered by CECS.

Cooperation Arrangements with Developing Countries: Exchange and cooperation programmes with Argentina, Brazil, Colombia, Mexico, Uruguay, Venezuela.

Other International Cooperation Arrangements: Exchange and cooperation programmes with Belgium, France, Italy, Sweden, USA, through MacArthur Foundation, Tinker Foundation, Muscular Dystrophy Association, Human Frontiers Science Programme (HFSP), European Community, French Ministry of Foreign Affairs, University of Ulm in Germany, Swedish Agency for Research Cooperation with Developing Countries (SAREC), Ford Foundation, National Institutes of Health (NIH), Grumbacher Foundation, International Union for Pure and Applied Physics, International Centre for Theoretical Physics (ICTP), the French Community of Belgium, Centro Latinoamericano de Física (CLAF).

Universidad de Chile — Departamento de Física, Facultad de Ciencias Físicas y Matemáticas

Address: Casilla 487-3, Santiago, Chile. **Phone:** (+56 2) 6712799; **Fax:** (+56 2) 6712799.

Director/Head: Dr. Lincoyan Gonzalez H.

Number of Research Scientists: 24; **Number of Staff:** 17.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Major Scientific Results or Products: Published papers.

Main Lines of Research and Training Activities: *Theoretical Physics:* (a) Non linear Physics: Numerical simulations of fluids and gases, turbulence, defects and vortex physics. (b) Gravitation and Cosmology: New solutions, quantization, models of galaxies (theoretical and numerical) and the dynamics and origin of dark matter. (c) Condensed Matter: surface physics (theoretical models and simulations). (d) Nuclear Physics: self consistent models of the nucleus. (e) Systems out of equilibrium; Chaos. *Experimental Physics:* Cosmic Rays Laboratory with stations at the Antarctic and at Santiago. (a) Condensed Matter - Surface Physics: Preparation of electroceramic thin films by evaporation and by hydrothermal-electrochemical methods. Materials characterization (Photoelectron and Auger

Spectrometry). Instrument development (STM). Crystallography. (b) Biophysics: Wastewater treatment with Biomass and bioenergy production. Genetic Code and evolution.

Main Research Facilities Available: Library, mechanical shop, glass-blowing shop; controlled atmosphere furnaces, helium refrigerator, high and UH vacuum equipment; personal computers; network with access to IBM 390, workstations; Perkin-Elmer 1257 XPS system with ion sputtering; powder and monocrystal diffractometers.

Future Development Plans: Two or three new scientists (PhD) for condensed matter group.

Cooperation Arrangements with Developing Countries: Visits of scientists from neighbouring countries; training of foreign students.

China

Chinese Academy of Sciences (CAS) — Beijing Laboratory of Electron Microscopy (BLEM)

Address: P.O. Box 2724, 100080 Beijing, China. **Phone:** (+86 1) 2568304; **Fax:** (+86 1) 2561422.

Director/Head: K.H. Kuo.

Number of Research Scientists: 8; **Number of Staff:** 3.

Scientific Fields of Interest: Biochemistry/Biophysics; Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: 1. Structure and defects of crystalline and quasicrystalline phases. 2. Structure of semiconducting superlattices. 3. Nanocrystallites 4. Cell structure and biological macromolecules. 5. Dynamic theory of transmission electron microscopy. 6. Scanning tunnelling microscopy.

Major Scientific Results or Products: Published 40 scientific papers in journals in North, including *Philosophical Magazine*, *Physical Review*, *J. of Physics*, *J. of Materials Science*.

Main Research Facilities Available: Phillips EM 420, Phillips EM 430, Phillips CM 12, Jeol 2010, Zeiss CEM 902 electron microscopes.

Future Development Plans: Flexible crystals such as C60, C70, macromolecules.

International Cooperation Arrangements: Joint research with Lehigh University, Bethlehem, USA, KFA Jülich, Germany.

Chinese Academy of Sciences (CAS) — Institute of High Energy Physics (IHEP)

Address: 19 Yuquan Road, Shijingshan District, P.O. Box 918, Beijing, 100039, P.R. China. **Phone:** (+86 1) 8219643; **Telex:** 22082 IHEP CN; **Fax:** (+86 1) 8213374; **E-mail:** xutz@bepc2.ihep.ac.cn.

Director/Head: Zhipeng Zheng.

Number of Research Scientists: 1,000; **Number of Staff:** 480.

Scientific Fields of Interest: Engineering/Technology; Physics/Astrophysics.

Main Lines of Research and Training Activities: Accelerator, spectrometer and particle physics, including theory, experiment and technology; cosmic ray research; nuclear physics; synchrotron radiation theory and its application; free electron laser.

Major Scientific Results or Products: Tau-charm physics, Precise measurement of tau mass; Beijing Electron Positron Collider (BEPC); Beijing Spectrometry (BES); Synchrotron Radiation Facility (BSRF); Beijing Proton Linac (BPL); Beijing Free Electron Laser (BFEL).

Main Research Facilities Available: BEPC; BES; BSRF; BPL; BFEL.

International Cooperation Arrangements: Cosmic ray research with Japan; BES data analysis with USA; collaborations with CERN, KEK, SLAC and other high energy physics laboratories.

Chinese Academy of Sciences (CAS) — Institute of Modern Physics (IMP)

Address: 253 Nanchang Road, Lanzhou 730 000, China; **Telex:** 72153 IMPAS CN; **Fax:** (+86 931) 8881100.

Director/Head: Yixiao Luo.

Number of Research Scientists: 180; **Number of Staff:** 470.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Low and intermediate energy heavy ion physics, including studies of heavy ion collision from low to intermediate energies and nuclei far from stability; application of heavy ions in materials and biological sciences; accelerator physics: detection techniques; application of nuclear techniques; postdoctoral station of nuclear physics; confers doctorate in nuclear physics and master's degree in nuclear physics, accelerator physics, nuclear electronics and detection techniques.

Major Scientific Results or Products: Synthesis and study of new heavy neutron-rich nuclids ^{208}Hg , ^{185}Hf and ^{227}Th ; design and construction of the Heavy Ion Research Facility Lanzhou (HIRFL); discovery of the reaction mechanism of incomplete deep inelastic collisions and the observation of mass transfer in heavy ion collision at low incident energy; design and construction of 2X2 MeV Tandem accelerator; theoretical study of variation of the shape and pairing of nuclei with spin and configuration; construction of decay schemes of neutron deficient nuclei ^{153}Er and ^{159}Yb , and observation of shape transition point at $N=86=88$ for isotope chains, including these two nuclei.

Main Research Facilities Available: Heavy ion accelerator system with 8 experimental equipments; data acquisition system; 600 KeV Cockcroft Walton accelerator; 200 KeV heavy ion implanter, 2X2 MeV tandem accelerator; VAX-8350 computer and PC computers; Library.

Future Development Plans: Construction of heavy ion cooler storage ring to cool heavy ion beams and increase beam energy up to 1 GeV (for light heavy ions) and 500 MeV (for heavy ones) for atomic physics and nuclear physics research, and for cancer therapy with heavy ions.

Cooperation Arrangements with Developing Countries: Scientist from developing country will be invited as postdoctoral candidate or guest scientist to join experimental research work at Institute.

Other International Cooperation Arrangements: Six cooperation agreements between Chinese Academy of Sciences and foreign institutions; three long-term collaboration agreements and protocols with institutes in Japan, Russia and France.

Chinese Academy of Sciences (CAS) — Institute of Physics

Address: P.O. Box 603, Beijing 100 080, China. **Phone:** (+86 1) 2553101; **Fax:** (+86 1) 2562605; **E-mail:** yang@aphy01.iphy.ac.cn.

Director/Head: Yang Guo-Zhen.

Number of Research Scientists: ~ 300; **Number of Staff:** ~ 400.

Scientific Fields of Interest: Materials; Physics.

Main Lines of Research and Training Activities: Low temperature physics and high Tc superconductivity, crystallography and crystal structure analysis, liquid physics, magnetism and magnetic materials, optical and laser physics, theoretical solid state physics, atomic and molecular physics, microgravity material research, "high pressure" physics, plasma physics, mesoscopic physics, surface physics.

Major Scientific Results or Products: Each year, publish about 600 papers, including 200 in international journals.

Main Research Facilities Available: Low temperature and high Tc measurement facilities, drop tube, thin film growth facilities and MBE, Tokamak and ECR plasma, magnetic measurement facilities, laser Raman spectrometer, laser and detection facilities, crystal growth facilities, surface analysis facilities, X-ray diffraction facilities.

Future Development Plans: Set up centre for condensed matter physics.

Cooperation Arrangements with Developing Countries: Plasma Division has joined Asian African Association for Plasma Training (AAAPT); plans to set up an AAAPT Research Centre.

Other International Cooperation Arrangements: A few agreements with other institutions or universities, such as Single Crystal Institute of Ukraine and Institute for Materials Research, Tohoku University, Japan.

Chinese Academy of Sciences (CAS) — Institute of Plasma Physics (ASIPP)

Address: P.O. Box 1126, Hefei, Anhui 230031, China. **Phone:** (+86 551) 5591601; **Telex:** 90109 ASIPP CN; **Fax:** (+86 551) 5591310.

Director/Head: Wan Yuanxi.

Number of Research Scientists: 127; **Number of Staff:** 436.

Scientific Fields of Interest: Energy; Engineering/Technology; Physics/Astronomy.

Main Lines of Research and Training Activities: Quasi steady state plasma performance at superconducting tokamak. Plasma experiment on Tokamak, including low hybrid current drive, ion cyclotron resonance heating, resonant helical field experiment; theory research of basic plasma physics; fusion-fission hybrid reactor conceptual design; R&D of fusion technology, including diagnostics, high pulse power supply, high vacuum technology and low temperature plasma application; high T_c superconductor and high magnetic field; since 1989, has received scientists from developing countries; in 1988 and 1993, held international summer schools of plasma physics.

Major Scientific Results or Products: Establishment of superconducting tokamak HT-7; H-mode performance on HT-6M tokamak. On HT-6B tokamak the helical field suppress MHD modes; comparison with theoretical calculation indicates there is only one global mode located near all resonant surfaces; 100 KW LHCD experiment on HT-6B and 400 KW ICRH experiment on HT-6M have given many results; ECR plasma implanting and coating technologies have been developed and begun to produce plasma deposition machines.

Main Research Facilities Available: HT-7 superconducting Tokamak and HT-6M Tokamak with more than 30 diagnostics; 200 MJ storage energy inductor; 4 sets of DC flywheel motor-generator, totally 80 MW; 1 set of AC 120 MW flywheel motor-generator; 2 MW ICRH system; 200 KW LHCD system; 40 KW ECR system; simple plasma mirror HER; 1 VAX 6410, 2 Micro VAX and 2 PDP 11/24 computers; 20 tesla hybrid steady-state magnet and 10 MW high stabilized DC power supply system, etc.

Future Development Plans: Establish HT-7 upgrade superconducting tokamak with LN and LHe cryogenic station; established 2 MW ICRH system in 1993; constructed 2 MW LHCD system; continue hybrid reactor programme.

Cooperation Arrangements with Developing Countries: Scientific cooperation agreements, with São Paulo University, Brazil and Azad University, Iran.

Other International Cooperation Arrangements: With World Laboratory, Geneva, Switzerland for Fusion Research Center; Federation Arrangement with International Centre for Theoretical Physics (ICTP), Trieste, Italy; scientific cooperation agreements with Kurchatov Scientific Center, Moscow, Russia and with National Fusion Institute, Nagoya, Japan. Joint Research Project with DRFC, Cadarache, France in International Scientific Cooperation Programme, Commission of European Communities.

Chinese Academy of Sciences (CAS) — Institute of Theoretical Physics

Address: P.O. Box 2735, Beijing 100 080, China. **Phone:** (+86 10) 62555058; **Telex:** 22040 BAOAS CN; **Fax:** (+86 10) 62562587.

Director/Head: Zhao-Bin Su.

Number of Research Scientists: 29; **Number of Staff:** 22.

Scientific Fields of Interest: Biophysics; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Research in all branches of theoretical physics: particles and fields, condensed matter theory, nuclear theory, atomic and molecular theory, gravity and cosmology, nonlinear science, computational physics, and biophysics; graduate programme towards master and doctorate degrees; postdoctoral positions: 7-8 per year; open to theoretical physicists from all over China; about 90 months project for visitors; many short-term visitors from abroad.

Major Scientific Results or Products: Each year, produce 90-110 research papers (most published in major international journals; contribute to international review journals include: *Physics Reports* 112 (1984) 1, 2421 (1994) 403; 282 (1997) 1; 118 (1985), 1; *Computer Physics Reports* 12 (1990), 289; staff has authored several books in English and in Chinese.

Main Research Facilities Available: Library with more than 40 major journals in physics; local computer network based on 16 Sun workstations with laser printers and terminals.

Future Development Plans: Maintain library and expand computer system; attract young talented physicists to join Institute.

Cooperation Arrangements with Developing Countries: No regular arrangements exist; Institute has invited physicists from neighbouring countries to attend activities on several occasions; ready to establish additional cooperation.

Other International Cooperation Arrangements: Regular Federation agreement with International Centre for Theoretical Physics (ICTP), Trieste, Italy; cooperation with CCAST (World Laboratory) for organization of some scientific activities.

Chinese Academy of Sciences (CAS) — National Laboratory for Infrared Physics

Address: No. 420 Zhong Shan Bei Yi Road, Shanghai 200083, China. **Phone:** (+86 21) 5317944, 5420850; **Fax:** (+86 21) 3248028; **E-mail:** jhchu@fudan.ihep.ac.

Director/Head: Junhao Chu.

Number of Research Scientists: 20; **Number of Staff:** 10.

Scientific Fields of Interest: Materials; Engineering/Technology; Physics/Astronomy.

Main Lines of Research and Training Activities: Opto-electronic physics, photonics; Interaction of infrared radiation with condensed matter; Narrow gap semiconductors; Quantum well physics; New opto-electronic materials and devices; NLIP can accept post doctors, PhD students and MS students in the study of above fields.

Major Scientific Results or Products: Physics for materials and devices important in infrared technology and applications; spectroscopy and optical properties of semiconductor superlattices, quantum wells and other low-dimensional systems; low energy excitations and their infrared spectroscopy for condensed matter.

Main Research Facilities Available: MBE systems (for III-V and II-VI), magneto-optical spectroscopy (FIR, IOT), Raman spectroscopy, PL spectroscopy, IR and Far IR spectroscopy transport measurements (0.3K, II Tesla), modulation spectroscopy, device physics measurements, VAX 4200 computer, etc. 3000 m² area.

Future Development Plans: Physics of narrow gap semiconductors; opto-electronics of semiconductor superlattices and quantum wells; new type of opto-electronic materials and devices.

Cooperation Arrangements with Developing Countries: Collaboration with Semiconductor Physics Research Center, Jeonbuk National University, Jeonju, Korea, in field of opto-electronics.

Other International Cooperation Arrangements: Joint collaboration programme for training PhD students with Volkswagen Foundation in Germany.

Chinese Academy of Sciences (CAS) — Purple Mountain Observatory (PMO)

Address: 2 Beijing Xilu, Nanjing 210008, China. **Phone:** (+86 25) 301096; **Telex:** 34144 PMONJ CN; **Fax:** (+86 25) 301459.

Director/Head: Zhang Hoqi.

Number of Research Scientists: 94; **Number of Staff:** 147.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Space astronomy; Orbit determination and study of natural and artificial bodies; Plasma astrophysics; Molecular clouds and star formation; Stellar physics and extragalactic astronomy; Positional astronomy and reference system study; Optical / TR detection techniques; Millimeter-wave radio astronomy; Stellar structure and evolution; Solar flare physics.

Main Research Facilities Available: 13.7 m mm-WHVH radio telescope at Qinghai field station; Balloon-borne X-ray proportional counters and FIR telescope; 60-cm reflector; solar fine-structure telescope at the Ganyu field station; 40/60-cm Schmidt telescope; VAX-11/780, SUN-4/470; 40-cm double astrograph; library; FD51010MS microdensitometer.

Future Development Plans: Large space programme concerning solar active region research (optical, X-ray and gamma ray) called Solar-B will probably be made in coming few years; possibility of developing technique of detecting system on non-solar X-ray satellite with USA.

Chinese Academy of Sciences (CAS) — Shanghai Astronomical Observatory (SHAO)

Address: 80 Nandan Road, Shanghai 200030, China. **Phone:** (+86 21) 6438-4522; **Telex:** 33164 SHAO CN; **Fax:** (+86 21) 6438-4618; **E-mail:** jlzhao@centre.shao.ac.cn.

Director/Head: Junliang Zhao.

Number of Research Scientists: 51; **Number of Staff:** 117.

Scientific Fields of Interest: Earth Sciences; Physics/Astronomy.

Main Lines of Research and Training Activities: Studies on the plate tectonic motion; Studies on the Earth rotation motion and their relations with disasters and sea-level change using VLBI, SLR and GPS; Open clusters and galaxy clusters; Studies on AGNs using VLBI and 1.56 m telescope; Simulation of molecular clouds and galaxies; Stellar variables.

Major Scientific Results or Products: Discovery of relationship of El Niño events with length of day (LOD); short periodical oscillations of Earth rotation and their relations with variations of atmosphere, ocean and solar activities; some astrophysical nature of open star clusters and galaxy clusters; special BL Lac objects with large sight angles.

Main Research Facilities Available: 1.56 m optical telescope with CCD camera; 25 m radio telescope at centimetres and decimetres; 60 cm satellite laser ranging facility; Computers: VAX3800, Sun465, Sun470, Sun330, Sun10, etc.; Two libraries at Shanghai and at Sheshan Station.

Future Development Plans: Asian-Pacific Space Geodynamics Project using space techniques, such as VLBI, GPS, SLR to measure and study plate tectonic motion and sea-level change in Asian-Pacific area and to research variation of spatial motion of Earth and relation of disasters to Earth motions.

Cooperation Arrangements with Developing Countries: Time cooperation with Pyong Observatory, Korea, D.P.R.; VLBI cooperation with Ooty Radio Observatory, India.

Other International Cooperation Arrangements: VLBI cooperation with NASA (USA), Australia, Japan, Holland, Germany, Sweden, Russia; SLR cooperation with Japan, NASA (USA), France, Australia, Russia; GPS cooperation with NASA/JPL; Earth rotation service with IERS; Crustal Dynamics Project with NASA/GSFC (USA) and Japan.

Chinese Academy of Sciences (CAS) — Shanghai Institute of Nuclear Research (SINR)

Address: P.O. Box 800-204, Shanghai 201 800, China. **Phone:** (+86 21) 59553998; **Fax:** (+86 21) 59553021.

Director/Head: Fujia Yang.

Number of Research Scientists: 600; **Number of Staff:** 600.

Scientific Fields of Interest: Biochemistry/Biophysics; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Marine; Medical Sciences; Physics.

Main Lines of Research and Training Activities: Nuclear physics and its applications; nuclear analysis techniques; radiation research and radiation processing; radiopharmaceuticals and radioisotope labelled compounds; nuclear detectors and nuclear electronics; accelerator; training course on preparation and control of radiopharmaceuticals; workshop (or training course) on food irradiation processing.

Major Scientific Results or Products: Over 200 papers on theoretical and nuclear physics, applied nuclear physics and chemistry, and nuclear electronics and other engineering studies; six kinds of radiopharmaceuticals, several kinds of radiation chemistry products, dynamitrons, radioimmunoassay systems, fire alarm systems and other electronic devices.

Main Research Facilities Available: 1.44 m synchro-cyclotron with proton beam energies variable from 10 to 30 MeV, a 4UH pelletron accelerator, 10 MV linear electron accelerator, 1.5 MV electron Van de Graaff accelerator, 2X6 MV Tandem accelerator, 1 200 KV neutron generator, Cobalt sources of 60, 100 and 250 K Curies.

Future Development Plans: R&D of radiopharmaceuticals; free electron laser and its applications in research and industry; nuclear instruments; radiation chemistry and radiation processing of material; nuclear analytical techniques and their application in interdisciplinary studies of life science, material science, environmental protection, geological and earth science and marine science; nuclear physics and accelerator-based atomic physics.

Cooperation Arrangements with Developing Countries: Nuclear instrument-leak detection of buried pipeline (Sri Lanka, Indonesia); radiation processing (Asia and Pacific region).

Other International Cooperation Arrangements: Coordinated research projects of International Atomic Energy Agency (IAEA) on human health and the environment and on marine sediments.

Chinese Academy of Sciences (CAS) — Shanghai Institute of Technical Physics

Address: 420 Zhong Shan Bei Yi Road, Shanghai 200030, China. **Phone:** (+86 21) 5420850; **Fax:** (+86 21) 3248028.

Director/Head: Yixun Yan.

Number of Research Scientists: 67; **Number of Staff:** 618.

Scientific Fields of Interest: Materials; Engineering/Technology; Physics/Astronomy.

Main Lines of Research and Training Activities: National Laboratory for Infrared Physics: Condensed matter theory, Far infrared spectroscopy, Super lattice quantum well, Raman scattering; Opto-electric signal processing; Detectors and detector arrays; Remote sensing instrumentations; Aerospace experimental equipments; Gas analysers, burglar alarms.

Major Scientific Results or Products: High resolution radiometers for meteorological satellite, airborne scanning, imaging spectrometer, HgCdTe detectors and focal plan arrays; charge coupled device; optical components, gas analysers, burglar alarms.

Main Research Facilities Available: 1 Library; Micro VAX II 486 and 386 computers, spectrophotometers from UV to 300 microns, molecular beam epitaxial systems, ion etching systems, coating machines, various kinds of lasers logic analysers.

Future Development Plans: Keep high level fundamental research, strengthen and support more applied research, and develop more competitive products.

Fudan University — Institute of Modern Physics

Address: Shanghai 200433, China. **Phone:** (+86 21) 6549-2222-4120; **Fax:** (+86 21) 65493232; **E-mail:** gjni@fudan.ihep.ac.cn.

Director/Head: Ni Guang Jiong.

Number of Research Scientists: 163; **Number of Staff:** 15.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: *Surface Physics Laboratory:* Surfaces and interfaces, silicon band gap engineering, STM. *Vacuum Physics Laboratory:* vacuum physics, thin film for information, surface electron spectroscopy. *Ion Beam Physics Laboratory:* accelerator based atomic and molecular physics. Ion beam analysis and modification, nuclear physics. *Laser Physics and Optics Laboratory:* optical nonlinearity; molecular and clusters, ultrashort pulses. *Theoretical Physics Group:* condensed matter physics, high energy physics, plasma theory. *Semiconductor Physics Laboratory:* semiconductor physics, magneto-optical physics. *Low Temperature and Superconductivity Laboratory:* SQUID, physics of liquid and fluid.

Major Scientific Results or Products: Blue light emitted from porous silicon; surface structure and electronic properties of polar semiconductors; surface absorption of halogen family and alkali metals on semiconductors; theory of conducting polymers; theory of fractals and composite media; theory of elementary particles; resonance photoelectron appearance potential spectroscopy; new design for a quadruple mass spectrometer; high T_c superconductor SQUID; Raman scattering of C₆₀; optical properties of LB films; life time of some nuclear levels; polarization mechanism of beam-foil.

Main Research Facilities Available: Four-stage tandem accelerator; Ion-scattering spectroscopy; MBE; Ultra-high vacuum electron beam evaporator; VG ADES-400; VG ESCA-LAB-5; Raman scattering spectroscopy; scanning auger microprobe; scanning tunnelling microscope; resonance photoelectron appearance potential spectroscopy; quasi-molecular laser; dye-laser and other type lasers; ultrasonic molecular beam set; spectroscopic ellipsometer; DLTS.

Future Development Plans: Surface physics laboratory has become national key laboratory and combination of ion beam physics laboratory and laser physics laboratory constitute another national key laboratory for ionic, molecular and laser photon beams; theoretical physics group has become key speciality in physics under Educational Committee of China.

Nanjing University — National Laboratory of Solid State Microstructures

Address: Nanjing 210093, China. **Phone:** (+86 25) 359-2756; **Telex:** 34151 PRCNU CN; **Fax:** (+86 25) 330-0535; **E-mail:** ningxu@netra.nju.edu.cn.

Director/Head: Nai-ben Ming.

Number of Research Scientists: 28 faculty, 60 PhDs; **Number of Staff:** 10.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Microstructures and defects in crystals; Phase transitions; Spectroscopy in solids; Fabrication of new materials: nonlinear optical crystals, crystals with periodic lamina of ferroelectric domains, ultrafine particles, semiconductor superlattices, amorphous semiconductor superlattices, metallic superlattices, liquid crystals; Solid state theory (high T_c superconductivity, low dimensional system, fractals and endrites, etc.).

Major Scientific Results or Products: Published more than 1700 papers and 48 academic books since establishment.

Main Research Facilities Available: HREM; TEM; AFM; X-ray diffractometer; HRXRD; NMR; EPR; Brillouin spectrometer; Raman spectrometer; atom probe and field ion microscope; magnetron sputtering; MOCVD; PLD; RF plasma deposition system; ps-ns optoelectron measurement system; internal friction and ultrasonic attenuation; crystal growth (Czochralski system).

Future Development Plans: Developing research fields such as dielectric and semiconductor superlattices, integrated ferroelectrics, nanophase materials science and fabrication technology; extending applications to optoelectron and nonlinear optics.

Cooperation Arrangements with Developing Countries: None at present time; plan to establish cooperative links with India, Brazil, Pakistan and Argentina.

Other International Cooperation Arrangements: Universities of Chicago, Alabama, Tokyo, Göttingen and the Institute of Crystallography in Russia. In future: Stanford University, MIT, University of California at Berkeley and Princeton University.

China, Taiwan

Academia Sinica — Institute of Atomic and Molecular Sciences (IAMS)

Address: P.O. Box 23-166, Taipei 10764, 10764 Taiwan, China. **Phone:** (+886 2) 3620212; **Fax:** (+886 2) 3620200.

Director/Head: Sheng Hsien Lin.

Number of Research Scientists: 28; **Number of Staff:** 16.

Scientific Fields of Interest: Chemistry; Physics.

Main Lines of Research and Training Activities: To improve understanding of chemical and physical principles relevant to development of applied sciences; major subjects of interest currently cover not only atoms and molecules but clusters, surfaces and bulk of condensed matter; these include theoretical atomic physics; laser spectroscopy, photochemical and photophysical processes, photodissociation of polyatomic molecules; laser chemistry, studies of molecular and ionic clusters; chemisorption and faceting on metal surfaces; NMR study of zeolites and multi-quantum relaxation in liquids; laser spectroscopy in condensed phases; inorganic chemistry, physics of ultrafast pulsed lasers and their applications.

Major Scientific Results or Products: Research in past few years has resulted in publication of more than 100 papers in international journals; subjects explored include laser spectroscopy on intramolecular rearrangement at highly vibrationally excited states of polyatomic molecules investigated by double-resonance spectroscopic techniques; quantum chemistry calculations on the isomerizations of triatomic molecules from uses of *ab initio* methods for potential energy surfaces and finite basis representations and discrete variable representations for exact solutions of Schrödinger equations; mean first passage time of activationless reaction with one crossing point curve crossed potential surfaces, rate processes for two crossing point problem, and solvent dynamic effects of fluorescence and hole-burning spectroscopy in whole friction regime; second-order nonlinear optical spectroscopy for probing absorbed molecules; femtosecond processes and ultrafast biological electron transfer; relation between surface atomic

structure and chemical reactivity, reaction kinetics and dynamics on ultrathin epitaxial metal films, characterization of microscopic spatial structure of dynamical screening charge at metal surfaces, and charge and energy exchange processes between low energy atomic particle and surface.

Major Research Facilities Available: MSL-90NMR, MSL-300NMR, lasers (Excimer, Dye, CO₂ Q-switched Nd: YAG Ar+, Ring), supersonic molecular beam apparatus, photofragment translation spectrometer, quadrupole and Fourier transform mass spectrometer, ultra-high vacuum system fully equipped for surface analysis.

Future Development Plans: Five major research groups and one laser facility centre will be established in coming years in photochemistry and molecular spectroscopy, molecular reaction dynamics, condensed matter, surface science and theoretical atomic/molecular sciences.

Cuba

Universidad de La Habana — Facultad de Física

Address: San Lazaro y L. Vedado, 10 400 La Habana, Cuba. **Phone:** (+537) 70-4270; **Telex:** 651 2210;

Fax: (+537) 33-3758; **E-mail:** sanchez@fmq.uh.edu.cu.

Number of Research Scientists: 67; **Number of Staff:** 15.

Scientific Fields of Interest: Energy; Materials; Engineering/Technology; Physics/Astronomy.

Main Lines of Research and Training Activities: Main lines: Solid state physics - fundamental and applicative research in semiconductor physics and semiconductor materials; magnetism and magnetic materials, ferro-piezo and piezoelectrics materials research; superconductivity and superconductors. Other lines: laser applications growth of crystals, image processing, electronics and computation, mathematical physics, fluids.

Major Scientific Results or Products: More than fifty papers per year in international journals; organization of more than one international meeting per year; Master and PhD programmes; research development activities linked with national needs.

Main Research Facilities Available: Molecular beam epitaxy system for III-V semiconductors growth; structural analysis laboratory (X-rays, scanning electron microscopy); vibrational magnetometer; optical spectroscopy equipment (Raman Absorption Photoluminescence); computer network; library.

Future Development Plans: Increase participation in national projects (Education Ministry, Science, Technology and Environment Ministry, University of Habana; participate in international projects (TWAS, TWNSO, European Union), establish collaboration programmes with international centres and institutions.

International Cooperation Arrangements: CINVESTAV-IPN, UASLP and UAZ, Mexico; UNICAMP, UFRJ and CNPq, Brazil; Antofagasta University, Chile. Planned: UFMG, Brazil. — CSIC, Spain; Max Planck Institute, Germany; MASPEC Institution, Italy; Linz University, Austria; ICTP, Italy.

Egypt

National Research Institute of Astronomy and Geophysics (NRIAG)

Address: Helwan, Cairo, Egypt. **Phone:** (+20 2) 788887, 780645, 788800; **Fax:** (+20 2) 782683.

Director/Head: H.A. Deebes.

Number of Research Scientists: 180; **Number of Staff:** 410.

Scientific Fields of Interest: Earth Sciences; Physics/Astronomy.

Main Lines of Research and Training Activities: Variable stars; interstellar matter; stellar structure and stellar atmosphere; galactic and extragalactic; celestial mechanics; solar activity and solar radiation; laser: tracking of artificial satellites; photometric studies of moon, night sky, zodiacal lights and twilight; studies of distant, regional and local earthquakes; theoretical applied seismology; earthquake engineering;

geomagnetism and magnetic properties of rocks; magneto-telluric; gravimetry, geodesy and recent crustal movements; geoelectricity and geothermics; electromagnetic and ground water.

Major Scientific Results or Products: Scientific contributions in national, regional and international research programmes and projects; exchange of data with national institutions, regional and world data centres.

Main Research Facilities Available: 74" reflecting telescope of Kotlamia Observatory; 30" reflecting telescope of Helwan Observatory; satellite laser tracking station; Helwan Solar Station; spectrographs, photometers and computers; Misarrat Geomagnetic Observatory; station of crustal deformation; station for drawing geodetic maps; station of magnetic properties of rocks; 20 seismic stations.

Future Development Plans: Install national network of telemetric seismic stations across country; upgrade 74" telescope of Kotlamia Observatory; add new accessories and equipment.

Cooperation Arrangements with Developing Countries: Each year, organize a one-month training seminar for 23 African and Arab candidates in cooperation with Japan Agency (JICA); future plans call for 74" telescope to serve all countries in region of Middle East and Africa.

Other International Cooperation Arrangements: International cooperation programme concerning tracking of artificial satellites by laser ranging for geodetic measurements between Europe and Africa; exchange of data with world data centres.

Ghana

Ghana Atomic Energy Commission — National Nuclear Research Institute (NNRI)

Address: P.O. Box 80, Legon, Accra, Ghana. **Phone:** (+233 21) 221323; **Telex:** 2554 GAEC GH; **Fax:** (+233 21) 773807.

Director/Head: J.H. Amuasi.

Number of Research Scientists: 39; **Number of Staff:** 29.

Scientific Fields of Interest: Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Medical Sciences; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Nuclear medicine; non-destructive testing; nuclear track detection; energy studies; nuclear related analytical techniques; nuclear instrumentation and digital interfacing; radiopharmacy; pesticide residue studies.

Major Scientific Results or Products: Installation of miniature neutron source reactor, gamma irradiation facility and non destructive testing facility nearly completed; significant results obtained in nuclear medicine, nuclear instrument interfacing, nuclear and nuclear related analytical techniques, geochronology.

Main Research Facilities Available: X-ray fluorescent facility; facilities for radon monitoring; nuclear medicine facility; neutron activation analysis facility; gamma irradiation facility; facilities for electronics work; computers; library.

Future Development Plans: With International Atomic Energy Agency (IAEA) assistance, will install miniature neutron source reactor for research.

Cooperation Arrangements with Developing Countries: As part of International Atomic Energy Agency (IAEA) programme, cooperate with African countries through AFRA; plan to enter into arrangements with Cuba, Egypt, South Africa, India.

Other International Cooperation Arrangements: IAEA, FAO, WHO and ICTP.

India

Council of Scientific and Industrial Research (CSIR) — National Physical Laboratory (NPL)

Address: Dr. K.S. Krishnan Marg, New Delhi 110 012, India. **Phone:** (+91 11) 578 7161; **Telex:** 031 77099 NPL IN, 031 77384 RSD IN; **Fax:** (+91 11) 575 2678, 576 4189; **E-mail:** root@csnpl.ren.nic.in.

Director/Head: A.K. Raychaudhuri.

Number of Research Scientists: 280; **Number of Staff:** 605.

Scientific Fields of Interest: Energy; Materials; Chemistry; Engineering sciences and technologies; Environment; Physics/Astronomy; Standards and calibration.

Main Lines of Research and Training Activities: Standards (Physico-mechanical standards; Electrical and electronics standards). Materials development. Low temperature physics. Materials characterization. Radio and atmospheric sciences. Basic and applied research.

Major Scientific Results or Products: NPL has the important responsibility of creating and maintaining standards of mass, length, time, volume, frequency etc. to exacting international standards. These are sent periodically to member countries for comparison. Material research and development of process for industrialization includes carbon, silicon and devices, display devices, superconducting materials and systems. Research in ionospheric and atmospheric sciences includes pollution, biodiversity, ozone depletion and radio communication aspects. Products: Teleclock for receiving/transmitting time over telephone; low-cost Cd-Te Solar Modules; powder X-ray diffractometer; green-coke-based high-density isotopic graphite.

Main Research Facilities Available: Low-temperature includes liquid helium, liquid nitrogen, high-pressure testing and calibration. Material characterization by means of X-ray, E-beam, EPR, IR. Major equipment: MBE, PECVD, reactors, Atm. radar, Laser Hetrodyne system. Library, computer centres, centralized workshop. Antarctic field station.

Future Development Plans: New low-temperature laboratory, ion beam processing laboratory, advanced global change and antarctic studios, solar phase voltaics using multicrystalline silicon thin films and sensors of various kinds, including biosensors.

Cooperation Arrangements with Developing Countries: Asia-Pacific Metrology Programme (APMP). South-South cooperation planned (with TWAS). CIMET Training Centre.

Other International Cooperation Arrangements: Augmentation of standards at NPL with PTB Germany. ILTB Russia. Bilateral programme with Eastern and Western European countries (Poland, Czech Republic, France, United Kingdom).

Institute of Physics — Bhubaneswar (IOPB)

Address: Bhubaneswar, 751005, Orissa, India. **Phone:** (+91 674) 481825; 481367; **Telex:** 0675-6386 IOP IN; **Fax:** (+91 674) 481142; **E-mail:** snb@iopb.emet.in.

Director/Head: S.N. Behera.

Number of Research Scientists: 25 Faculty; 50 Scholars; **Number of Staff:** 95.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Particle and high energy physics (theory); Nuclear physics (theory); Condensed matter physics (theory and experiments); Atomic and molecular physics (theory and experiments). One year post MSc training programme in advanced research methodology (predoctoral course).

Major Scientific Results or Products: Basic research in above areas of physics resulting in publication in recognized journals and presented in international and national conferences and symposia.

Main Research Facilities Available: Library; computing facilities; 3MV Pelletron accelerator and associated facilities with 5 beam lines; 13 KV rotating anode X-ray generator; communication facilities: telex, fax, e-mail.

Future Development Plans: Activities in astrophysics and biophysics being considered for widening scope of research in next few years; accelerator based mass spectrometry (AMS) facility being developed; access to Internet planned.

Cooperation Arrangements with Developing Countries: Affiliated institution of ICTP.

Other International Cooperation Arrangements: Project based Indo-US, Indo-German, and Indo-French collaborations; part of CERN-India collaboration in WA-98 and LHC-CMS experiments.

Inter-University Centre for Astronomy and Astrophysics (IUCAA)

Address: Post Bag 4, Ganeshkhind, Pune 411 007, India. **Phone:** (+91 212) 336415; **Telex:** 0145-7658 GMRT IN; **Fax:** (+91 212) 335760; **E-mail:** root@iucaa.ernet.in.

Director/Head: Jayant Vishnu Narlikar.

Number of Research Scientists: 26; **Number of Staff:** 45.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Fundamental research in astronomy and astrophysics (A&A) in following areas: solar and planetary studies; galactic astronomy; stellar structure and evolution; high energy astrophysics; extra galactic astronomy; theoretical cosmology; particle physics-astrophysics interface; gravitation and relativity; gravitational waves; observational anomalies and non-standard approaches; training: PhD in astronomy and astrophysics; refresher courses for teachers of A&A; summer, winter and autumn schools for students and teachers of A&A; conferences and symposia for exchange of ideas.

Major Scientific Results or Products: Data analysis from gravity wave detectors internationally acclaimed for its algorithms and techniques; work on quantum gravity and early universe; interpretation of extragalactic data on quasars and galaxies; fabricated small automated photo electric telescope (prototype) being tested; obtained important results on structure formation in universe.

Main Research Facilities Available: Computerized library with over 8000 books on astronomy, astrophysics and related areas; computer network with advanced Sun workstations for numerical computing and image processing; dedicated e-mail link with NCST Bombay with worldwide access to computers and databases; astronomical data centre has collection of astronomical catalogues and data bases with software for efficient retrieval of data; developing instrumentation laboratory for astronomical telescopes and detectors.

Future Development Plans: Intend to have optical telescope in 2 metre class for use by university community in India; telescope is expected to be sited on hilltop near Giravali Village about three hours' drive from IUCAA; instrumentation laboratory proposing to participate in making of optical and infrared spectrographs for use on this telescope; number of associates expected to reach 100 in next 3-4 years; strengths in theoretical areas such as cosmology and structure formation, data-analysis of gravitational waves, galaxy morphology will continue to grow; more academics from universities expected to be drawn into areas of observation/ instrumentation.

Cooperation Arrangements with Developing Countries: Agreement with China for series of Sino-Indian workshops in astronomy and astrophysics.

Other International Cooperation Arrangements: Indo-US exchange agreement with Smithsonian Institution; Indo-French collaboration under Indo-French Centre for Promotion of Advanced Research; MOU with AIGO Project in Australia.

Physical Research Laboratory (PRL)

Address: Navrangpura, Ahmedabad 380 009, India. **Phone:** (+91 272) 462129; **Telex:** 0121-6397; **Fax:** (+91 272) 460502; **E-mail:** root@prl.ernet.in.

Director/Head: Ram Kumar Varma.

Number of Research Scientists: ~125; **Number of Staff:** ~400.

Scientific Fields of Interest: Space and Atmospheric Physics; Astronomy and Astrophysics; Theoretical Physics; Earth sciences: Climate and Solar System Studies.

Main Lines of Research and Training Activities: *Astronomy and Astrophysics:* infrared astronomy; radio astronomy; solar physics. *Planetary Atmospheres and Aeronomy:* middle atmospheric studies; upper atmospheric studies; laboratory astrophysics. *Earth Science and Solar System Research:* geochronology; geochemistry; nuclear oceanography and limnology; palaeoclimate and environment; meteorite and lunar studies; cosmic rays. *Theoretical Physics:* astrophysics; meteorology and climate studies; plasma physics; classical and quantum physics; particles and fields; atomic and molecular physics; nuclear physics. *Training:* graduate programme leading to PhD degree, provides project training in computer science and application to postgraduate video project training in computer science and

application to postgraduate and graduate students, and summer training programme to students pursuing Master's degree in physics; training in electronics, radio engineering and instrumentation to engineering and diploma students.

Major Scientific Results or Products: Publications in relation to the research fields.

Main Research Facilities Available: Radio telescope at Thaltej near Ahmedabad; solar telescope at Udaipur Solar Observatory; infrared telescope at Mt. Abu; library; computer centre; electronics laboratory; workshop; engineering services; scanning electron microscope; liquid nitrogen plants; C-14 dating laboratory; Ion probe; lidar; mass spectrometer for stable isotopes, Rb-Sr, Ar-Ar; radiation detectors; nuclear track laboratory; gas chromatograph; X-ray diffractometer.

Future Development Plans: Satellite for atmospheric studies: thermospheric dynamics and plasma instabilities; wave motions in mesosphere and lower thermosphere; satellite for astronomical studies: OH/IR sources; late type objects; compact IR sources in dark clouds; symbiotic stars; extragalactic sources.

Cooperation Arrangements with Developing Countries: Mostly at individual scientists level.

Other International Cooperation Arrangements: Germany: ISRO-DLR; Russia; France: ISRO-CNES; in addition, collaboration exists on individual level.

University of Pune — Department of Physics

Address: Pune 411 007, India. **Phone:** (+91 212) 352678, 356061; **Telex:** 1457719 UNIPIN; **Fax:** (+91 212) 350087, 353899; **E-mail:** plk@physics.unipune.ernet.in.

Director/Head: P.L. Kanitkar.

Number of Research Scientists: 44; **Number of Staff:** 35.

Scientific Fields of Interest: Energy; Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: The main activity is post graduate teaching which is supported by research, per year produced 55-60 MSc, 4-5 MTechs in Atmospheric Science, 4-5 MPhils and 5-7 PhDs in Physics. Works in areas of material science, semiconductor devices, solid state physics, biophysics, accelerators, space physics, lasers and energy-resources.

Major Scientific Results or Products: Communicate major scientific results in international research journals and publish 25 to 30 research papers/year.

Main Research Facilities Available: Facilities for surface studies, characterization of materials (ESCA, XPS, XRD, SEM, FEM, FIM, thin films, CVD; excimer, Co₂, Nd-YAG lasers; race-track microtron (1-8 MeV), 14 MeV neutron generator; liquid nitrogen plant, computational facilities, central library.

Future Development Plans: Material synthesis of metals, alloys (coordered and disordered), semiconductors and ceramics, mesoscopic systems-nanomaterials and clusters, surface and interface studies, laser material processing, diamond and diamondlike materials; Cherenkov free electron laser; processing of semiconductor devices by electrons and Radiation; development of Sensors and analytical instruments.

International Cooperation Arrangements: Collaborations programme with centre for advanced studies, New Mexico, University (USA).

University of Pune — Tata Institute of Fundamental Research (TIFR) — National Centre for Radio Astrophysics (NCRA)

Address: Poona University Campus, Post Bag 3, Ganeshkhind, Pune 411 007, India. **Phone:** (+91 212) 336105, 337107; **Telex:** 0145 7658 GMRT IN; **Fax:** (+91 212) 345149 ; **E-mail:** root@gmrt.ernet.in.

Director/Head: V.K. Kapahi.

Number of Research Scientists: 60; **Number of Staff:** 190.

Scientific Fields of Interest: Radio Astronomy and Astrophysics/Physics and Astronomy/Engineering Sciences and Technologies.

Main Lines of Research and Training Activities: Radio astronomy; astronomical image processing; computers, parallel processing; antenna technology (structural, mechanical, electrical); Electronics (antenna feeds, low noise amplifiers, high stability local oscillators, digital correlators, optical fibre communication etc.).

Major Scientific Results or Products: Over 400 research publications in radio astronomy and related areas; 25 PhDs; 2 patents; antenna technology developed led to indigenous production of microwave antennas worth over US\$40 million.

Main Research Facilities Available: 530m x 30m Ooty Radio Telescope in operation since early 1970s; giant metrewave radio telescope (GMRT) consisting of 30 nos. of 45m dia. parabolic dishes under construction at Khodad (90 km north of Pune); computing facilities including Sun workstations, parallel processing computers, etc; 3 fully equipped electronic laboratories at Ooty, Pune and Khodad; maintenance workshops at Ooty and Pune with adequate equipments.

Future Development Plans: Form microwave antenna and communication group; explore the possibility of setting up a few antennas, from several tens to hundreds of kms distant from GMRT, form very long baseline interferometer.

Cooperation Arrangements with Developing Countries: Interested scientists encouraged to visit NCRA.

Other International Cooperation Arrangements: VLBI using telescopes in India, China, Japan, USA and Europe; Collaboration and mutual visit of scientists with institutions in USA, Germany, Holland.

Raman Research Institute (RRI)

Address: C.V. Raman Avenue, Sadashivanagar P.O. Bangalore 560 080, India. **Phone:** (+91 80) 3311012; **Fax:** (+91 80) 3340492; **E-mail:** nkumar@rri.ernet.in.

Director/Head: Narendra Kumar.

Number of Research Scientists: 56; **Number of Staff:** 212.

Scientific Fields of Interest: Materials; Chemistry; Engineering/Technology; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: *Astronomy and Astrophysics:* observational radio astronomy, pulsars, interstellar matter and recombination lines. *Liquid Crystals:* materials synthesis and characterization; phase transition; dynamics; topological defects, LCD and addressing techniques. *Experimental Optics:* light scattering; geometric phases; quantum and non-linear optics. *Theoretical Physics:* field theory and quantum gravity; gravitational waves; stellar dynamics; condensed matter physics—super conductivity, quantum transport in disordered system; soft-condensed matter.

Major Scientific Results or Products: Origin and evolution of binary and millisecond pulsars; low frequency recombination lines (stimulated emission) from interstellar matter; development/construction of radio telescopes, new types of liquid crystalline phases (discotic, TGB); chiral-symmetry broken structures with locomotion; solitons, monolayer to 3D transitions; multiline addressing systems; random laser action; new results in theoretical physics.

Main Research Facilities Available: 10.4 metre millimeter-wave telescope; 150 MHz synthesis telescope (Mauritius); radio interferometer (34.5 MHz); X-ray image plate, Malvern correlator for light scattering studies; fluorescence and polarizing microscope; home-built STM, IR, UV, NMR spectrometers, superconducting magnet; 25 workstations (digital, Sun and SGI, 150 M Flops capacity); 150 PCs networked; LAN and Internet connectivity; e-mail; library (computerized with Internet connectivity for downloading).

Future Development Plans: Above facilities and other national and international facilities will be used; new studies on lyotropic liquid crystals, continuation of high electric field and Langmuir monolayer studies on different types of liquid crystals, novel liquid crystal systems; soft-condensed matter. Light scattering, non-linear and Quantum optics; quantum gravity; low-temperature physics.

Cooperation Arrangements with Developing Countries: Major collaboration with University of Mauritius in building and operating radio telescope there and in manpower development; visiting programme with Brazil; close links with TWAS and ICTP (through Fellowship/Staff Associateship).

International Cooperation Arrangements: Indo-Italian Exchange Programme and Indo-American Project. Support from ICTP towards Optics Laboratory.

Saha Institute of Nuclear Physics

Address: Sector 1, Block AF, Bidhannagar, Calcutta 700 064, India. **Phone:** (+91 33) 370313; **Telex:** 21-4103 SINP IN; **Fax:** (+91 33) 374637; **E-mail:** mpal@saha.ernet.in.

Director/Head: M.K. Pal.

Number of Research Scientists: 116; **Number of Staff:** 172.

Scientific Fields of Interest: Biochemistry/Biophysics; Materials; Chemistry; Mathematics; Physics/Astronomy; High-Temperature Plasma Physics.

Main Lines of Research and Training Activities: Nuclear Physics: gamma spectroscopy; nuclear structure and reactions. Theoretical High Energy Physics: Gauge field theory; string theory; hadron spectroscopy; phenomenology of high energy collisions. Astrophysics: Early universe; neutrino astrophysics, quark-gluon plasma. Condensed Matter Physics: high-temperature superconductivity; statistical physics; others. Plasma Physics: Tokamak Hot Plasma studies; theoretical Plasma Physics. Atomic and Molecular Physics. General and Mathematical Physics: non-linear system and chaos. Chemistry: Radio Chemistry, Radiation Chemistry, Photochemistry. Bioscience: Liposome and membrane biology; molecular and Genetic toxicology; virology; radiobiology; biomolecular and macromolecular crystallography; physical biochemistry; theoretical biology. Instrumentation: microwave instrumentation; VHF/UHF communication; nuclear instrumentation. Training activities: Pre-PhD diploma courses in physics, bioscience, radiological physics.

Major Scientific Results or Products: Foundations of nuclear physics research in India were laid down in this Institute with pioneering contributions to development of accelerator technology, cyclotron and Cockroft-Walton generator, beta-ray and mass spectrometers, nuclear instrumentation, electron microscope (for biophysical research) and NMR spectrometers; achievements resulted in rapid expansion of research activities of Institute; important contributions, both theoretical and experimental, made in variety of fields—particle physics, plasma physics, solid state physics, atomic and molecular physics, crystallography, biophysics, nuclear chemistry.

Main Research Facilities Available: *Equipment:* Tokamak machine; multi-detector gamma-ray sum spectrometer; Compton suppressed HPGe spectrometer; spectrometers (NMR, Mössbauer, Laser Raman); SQUID magnetometer; X-ray diffractometers; liquid nitrogen and helium plants; secondary ion mass spectrometer; isotope separator; 300 KV ion accelerator; electron microscope; ultracentrifuge fluorescence spectrophotometer; gas chromatograph; HPLC system; Laser flash photolysis system; Co60 gamma-chamber, HPGe detector and MCA. Computers: Horizon III and Magnum minicomputers (HCL) AT 386 and AT 486 Personal Computers (Olivetti); library; photocopying; fax and e-mail; workshop.

Future Development Plans: Basic research in front-line areas of various branches of theoretical physics; several new areas developed for carrying out extensive experimental work; high-temperature Tokamak plasma; software development with microprocessor based computer facility; research on atomic, molecular and surface physics with electron and ion-beams; high-temperature superconductivity; fast reaction kinetics; development of protein single crystals and structural studies of large molecules; nuclear reaction and structure studies with suitably developed instrumentation.

International Cooperation Arrangements: Federation Agreement with ICTP.

Iran, Islamic Rep.

Center for Theoretical Physics and Mathematics

Address: P.O. Box 11365-8486, Tehran, Iran, Islamic Republic. **Phone:** (+98 21) 800 3472; **Telex:** 212165 AEOI.IR; **Fax:** (+98 21) 630 314; **E-mail:** ctpmseai@attmail.com.

Director/Head: A. Farnad.

Number of Research Scientists: 30 PhDs; **Number of Staff:** 5.

Scientific Fields of Interest: Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Astrophysics; physics of fundamental particles; condensed matter; nuclear physics; statistical mechanics; relativity; different fields of mathematics.

Major Scientific Results or Products: Scientific essays printed in international scientific journals.

Main Research Facilities Available: PC computers; library.

Future Development Plans: Main plan in training advancements.

Cooperation Arrangements with Developing Countries: No formal arrangements.

Sharif University of Technology — Department of Physics

Address: P.O. Box 11365-9161, Tehran, Iran, Islamic Rep. **Phone:** (+98 21) 600-5410; **Telex:** 212882 UTIR; **Fax:** (+98 21) 601-2983.

Director/Head: A. Anvari.

Number of Research Scientists: 18 PhD; 30 PhD students; **Number of Staff:** 5.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Training: Physics leading to BS, MS, PhD Research: Theoretical particle physics (string theory, CFT, etc.); Cosmology; Condensed matter (surface and thin film physics, HT superconductivity); Complex systems; Gamma ray astronomy; Laser and optics.

Major Scientific Results or Products: Several publications in above fields; discovery of point like strong Gamma-ray sources near central region of the Milky way.

Main Research Facilities Available: Library; spectrometers (IR, UV, Visible); sputtering system; magnetic laboratory; computer centre, including Vax stations; machine and electronic shops.

Future Development Plans: Develop activities in condensed matter physics and plasma physics both in theory and experiment.

Cooperation Arrangements with Developing Countries: Holding conferences in collaboration with countries in Caspian sea region.

Shiraz University — Department of Physics

Address: Shiraz, 71454, Iran, Islamic Rep. **Phone:** (+98 71) 24609; **Fax:** (+98 71) 20027.

Director/Head: M.R. Eskandari.

Number of Research Scientists: 20; **Number of Staff:** 4.

Scientific Fields of Interest: Energy; Engineering/Technology; Physics/Astronomy; Atomic; Solid.

Main Lines of Research and Training Activities: Fission-fusion reactions; fusion systems and techniques; nuclear physics; solid state and atomic physics; stellar dynamics; gravitation; cosmology; stellar photometry; laser and relevant technologies.

Main Research Facilities Available: Computers; library.

Future Development Plans: Mostly focused on high level training courses.

Jordan

Yarmouk University — Center for Theoretical and Applied Physics (ICAC/Irbid)

Address: 211-63 Irbid, Jordan, **Phone:** (+962 2) 271100; **Telex:** 51533 Yarmuk JO; **Fax:** (+962 2) 274725.

Director/Head: Nihad A. Yusuf.

Number of Research Scientists: 23; **Number of Staff:** 2.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Computational condensed matter physics; magnetism and magnetic materials; use of computers in physics and mathematics; organizing biennial Petra School of Physics; organizing biennial meetings in computational condensed matter physics and magnetism.

Major Scientific Results or Products: Establishing new research line in field of theoretical condensed matter physics; establishing nuclei for regional scientific collaborations and providing necessary support for exchange visits; organizing number of scientific meetings.

Main Research Facilities Available: Computers; Library, laboratories for research in magnetism housed in physics department.

Future Development Plans: Building infrastructure for materials fabrication and characterization; establishing and supporting research groups in fields of materials science and computational condensed matter physics; establishing programme for annual scientific meetings and training sessions.

International Cooperation Arrangements: Developing cooperation with physicists in Jordan, Syria, Egypt, Tunisia, Morocco, including exchange visits and joint supervision of graduate work. ICTP contributes to organizing scientific meetings.

Mexico

Centro de Investigación y de Estudios Avanzados (CINVESTAV) del IPN — Departamento de Física

Address: Apdo. Postal 14-740, 07000 México, D.F. Mexico. **Phone:** (+52 5) 747 7098; **E-mail:** admision@fis.cinvestav.mx.

Director/Head: Miguel A. Pérez-Angón.

Number of Research Scientists: 51 (PhDs); **Number of Staff:** 28 technical staff.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: High energy physics (theory and experiment); Solid state physics (theory and experiment); Mathematical physics; Statistical physics (theory and experiment).

Major Scientific Results or Products: Faculty publishes about 100 papers per year in research journals; graduate 10 PhD and 20 MSc students per year.

Main Research Facilities Available: *Computers:* 10 workstations, 100 PC. *Labs:* 10 research labs on different aspects of thin film characterization and spectroscopy (MBE.), workshop.

Future Development Plans: Plan to develop new research groups in experimental statistical physics and medical physics.

Cooperation Arrangements with Developing Countries: Several agreements with institutions from Cuba, Colombia, Argentina and Brazil.

Other International Cooperation Arrangements: Several agreements with institutions from USA, Germany, Italy, France and CERN.

Universidad Autónoma de Puebla — Instituto de Física (IFUAP)

Address: Apdo. Postal J-48, Puebla, Puebla 72570, Mexico. **Phone:** (+52 22) 457645; **Fax:** (+52 22) 448947.

Director/Head: Nicolas Rutilo Silva Gonzalez.

Number of Research Scientists: 29 PhD; **Number of Staff:** 13.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Optical and electronic properties of surfaces; electronic and transport properties of semiconductors; structural properties of materials; superconductivity; non-linear dynamics and chaos; elementary particles; quantum electronics; non-linear optics; atomic and molecular physics; statistical Physics; transport properties of mesoscopic billars: quantum-classical correspondence; synthesis of new materials.

Major Scientific Results or Products: From 1976 (3 PhD) to May 1997 (29 PhD) faculty has published more than 400 research papers, 36 monographies, 12 works in education and three books; supervised 13 PhD 78 MSc and 130 BSc theses and more than 600 graduate and undergraduate courses at University have been provided by Institute.

Main Research Facilities Available: *Computing Center:* 1 H.P. Apollo 755, 3 H.P. Apollo 735, 1 H.P. 9000/700, 3 Pentium/100, 27 Pentium/150, 3 Pentium/200, 5 P.C. 486/33, 2 P.C. 486/66. 1 P.C. 486/100, printers and plotter, local network and internet service. *Library:* 2,000 volumes and regular subscriptions to 57 journals. 12. *Laboratories:* Raman spectroscopy, luminescence, spectroellipsometry, modulated reflectance, laser optics, electretos, solid state chemistry, liquid phase epitaxy, X-ray diffraction, SEM, AES and XPX, DC-magnetron sputtering, MOCVD. 2 workshops; mechanical and electronics.

Future Development Plans: Increase experimental facilities; update and enlarge library and number of offices for professors and graduate students; increase faculty in both theoretical and experimental areas.

Cooperation Arrangements with Developing Countries: Brazil, Cuba and Uruguay.

Other International Cooperation Arrangements: ICTP-IFUAP, National Science Foundation (USA)-IFUAP.

Universidad Autónoma de San Luis Potosí — Instituto de Física

Address: Alvaro Obregón 64, 78000 San Luis Potosí, SLP, Mexico. **Phone:** (+52 48) 137557; **Fax:** (+52 48) 133874.

Director/Head: Magdaleno Medina-Noyola.

Number of Research Scientists: 16 PhD; 3 MSc; **Number of Staff:** 6.

Scientific Fields of Interest: Biochemistry/Biophysics; Energy; Materials; Physics/Astronomy; Physical Chemistry.

Main Lines of Research and Training Activities: Physics of Alloys; Magnetic Materials; Nanostructures; Quasicrystals; High T_c Superconductors; Ultrathin Organic Films; Protein channels; Composites Materials; Semiconductors; Elemental particle physics; Statistical physics; complex fluids physics; physical chemistry.

Major Scientific Results or Products: In the last five years faculty published 153 scientific papers in international journals; graduate programme supported by faculty granted 8 PhDs and 38 MSc degrees.

Main Research Facilities Available: Subscribe to over 60 Journals in physics and related fields; computer network based on 14 workstations; laboratories of magnetism, optical characterization crystal growth, complex fluids and physical chemistry; STM, AFM and optical microscopes, FRAP and light scattering systems.

Future Development Plans: Consolidate experimental groups; open areas of high energy physics and biophysics, which should be consolidated in next five years.

Cooperation Arrangements with Developing Countries: Cooperation efforts with Universidad Federal Fluminense, Brazil, Centro Atomico Bariloche, Argentina, Universidad de los Andes, Venezuela, Univ. La Habana Cuba.

Other International Cooperation Arrangements: Cooperation projects with University of Texas, University of New York, UCLA, UCSB, University of Maryland, University of Chicago, USA. Universität Berlin, Germany, CNRS, France.

Universidad Autónoma Metropolitana-Iztapalapa (UAM-I) — Departamento de Física

Address: Apartado Postal 55-534, 09340 Mexico D.F. Mexico. **Phone:** (+52 5) 724-4610; **Telex:** 1764296 UAMME; **Fax:** (+52 5) 724-4611; **E-mail:** fisica@xanum.uam.mx.

Director/Head: Salvador Cruz Jimenez.

Number of Research Scientists: 60; **Number of Staff:** 15.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Optical properties of solids; Study of mesoscopic systems; Thermoluminescence; Nonlinear optics and holography; Laser physics; Atomic collision theory; Radiation dosimetry; Statistical mechanics and thermodynamics; Theory of stochastic processes; Bulk and surface properties of liquids; Colloid physics; Classical and quantum gravitation and cosmology; Polymer science; Classical mechanics and electrodynamics.

Major Scientific Results or Products: On average, publish 75 scientific papers in international journals and supervise 2 PhD theses and 5 MSc theses each year; preparation and characterization of solid crystalline and amorphous materials used for IR-V energy conversion; design and construct high power nitrogen lasers; stopping power theory for ions in compound materials; derivation of Langevin stochastic equations from microscopic systems described by different types of Hamiltonians; thermodynamic analysis of a double layer in liquids; models for colloidal interactions; fundamentals of extended irreversible thermodynamics; new methods for polymer characterization; polymer synthesis for industrial; Hamiltonian mechanics for non-integrable systems; study of ballistic electrons in mesoscopic systems; gauge theory-like formulations of gravity and matter; physical cosmologies beyond general relativity.

Main Research Facilities Available: Library; computing services including network of PCs in each office connected to central computer centre; IBM workstations; silicon graphics crimson; supercomputer centre with silicon graphics power challenge and CM-5 systems; high resolution electron microscope; scanning electron microscope; electron paramagnetic resonance facility; nuclear magnetic resonance facility.

Future Development Plans: Consolidation of new developing areas, such as solid state physics and atomic and molecular physics; acoustics laboratory applied to condensed matter systems.

Cooperation Arrangements with Developing Countries: Several collaborative programmes with universities and research centres in other developing countries, mainly supported by Mexican National Council for Science and Technology (CONACYT).

Other International Cooperation Arrangements: Several international cooperation agreements with institutions in Europe, USA, Canada and Australia.

Universidad Nacional Autónoma de México (UNAM) — Instituto de Ciencias Nucleares

Address: Ciudad Universitaria, Del. Coyoacan, 04510 Mexico, D.F. Mexico. **Phone:** (+52 5) 622 4670;

Fax: (+52 5) 616 2233; **E-mail:** ocasta@servidor.unam.mx.

Director/Head: Octavio Castañeros Garza.

Number of Research Scientists: 46; **Number of Staff:** 40.

Scientific Fields of Interest: Chemistry; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Nuclear and molecular structure; laser and E.P.R. spectroscopies; radiation chemistry; plasma physics; field theory and hadronic structure; classical and quantum gravity; plasma chemistry; mathematical physics.

Major Scientific Results or Products: Basic research and relevant contributions in following areas: nuclear physics; molecular physics, relativity and gravitation, radiation interaction with matter and radiation chemistry.

Main Research Facilities Available: Library: about 9,000 volumes, received 93 journals in 1996. Gammabeam 651 PT, 11 386 PC, 29 486 PC, 20 Pentium PC, 9 workstations, 5 servers, An I.R. chromatograph.

Future Development Plans: Develop new theoretical and experimental research area on subject; ion and atomic traps and its applications; for this reason, organizing XXXI Latin American School of Physics in summer of 1998; participate in theoretical aspects of Auger project.

Cooperation Arrangements with Developing Countries: Collaboration with Universidad del Mar del Plata (Argentina), Universidad de Campinas, (Brazil), Universidad de la Plata (Argentina), Universidad Católica de Chile (Chile), Universidad de Buenos Aires (Argentina), Centro Atómico Bariloche (Argentina), U. Simón Bolívar (Venezuela), Universidad de Santiago (Chile).

Universidad Nacional Autónoma de México (UNAM) — Instituto de Física

Address: Apdo. Postal 20-364, Ciudad Universitaria, 01000 Mexico, D.F. Mexico. **Phone:** (+52 5) 665-7263; **Telex:** 177-4523 UNAM ME; **Fax:** (+52 5) 616-1535; **E-mail:** ifunam@unam.vmi.

Director/Head: Octavio Novaro Peñalosa.

Number of Research Scientists: 137; **Number of Staff:** 226.

Scientific Fields of Interest: Biochemistry/Biophysics; Materials; Chemistry; Engineering/Technology; Physics/Astronomy.

Main Lines of Research and Training Activities: Theoretical nuclear physics; experimental nuclear physics; mass spectrometry; applications of nuclear techniques; applications of radiation; high energy theoretical physics; mathematical physics; experimental atomic physics; theoretical atomic and molecular physics; field theory; foundations of quantum mechanics; biophysics; thermodynamics and statistical mechanics; solid state physics; quasicrystals; complex dynamical systems; optical properties of solids; thermodynamic, magnetic and transport properties; metallurgy and materials physics; diffraction theory; crystallography; chemical physics; crystal growths; catalysis and surface science; thin metal films; semiconductors and superconductors; design of scientific instruments; digital image processing; dosimetry; ion optics; high temperature superconductivity; high pressure physics; radiation dosimetry.

Major Scientific Results or Products: 130 scientific articles in international journals; 70 proceedings in international conferences; 100 oral presentations in physics meetings or interdisciplinary fields. 50 Bachelor (Phys.) theses; 15 Master of Science (Phys.) theses; 7 PhD (Phys.) theses.

Main Research Facilities Available: Library; computing services; workshop; vacuum, electronics, automatization and audiovisual laboratories; 3 Van de Graaff particle accelerators (electrons and positive

particles); high-resolution electronic microscope; scanning electron microscope; tunnelling electron microscope; electronic paramagnetic resonance.

Cooperation Arrangements with Developing Countries: Collaborations with universities and national laboratories of developing countries, some of them supported by Mexican National Council for Science and Technology (CONACyT).

Morocco

Université Mohammad V — Laboratoire de Physique Théorique

Address: Faculté des Sciences, Avenue Ibn Batouta, B.P. 1014, Rabat, Morocco. **Phone:** (+212 7) 77-89-73 Ext. 33; **Fax:** (+212 7) 77-8973; 77-42-61.

Number of Research Scientists: 34; **Number of Staff:** 1.

Scientific Fields of Interest: Physics/Astronomy; Mathematics.

Main Lines of Research and Training Activities: *Research:* Quantum groups and deformations; Geometrical quantization; Conformal supergravity; Gravitation and cosmology; PC violation; Heavy mesons production. *Training:* First year, post graduate diploma in theoretical and mathematical physics (about 500 lectures); second year, advanced lectures in theoretical physics by invited lecturers (foreigners in general).

Major Scientific Results or Products: Scientific publications in major scientific journals; theses; training of scientists to become university's lecturers and researchers.

Main Research Facilities Available: Library of LPT-ICAC (about 2000 specialized books; main journals); Computer.

International Cooperation Arrangements: Affiliation and federation arrangements with ICTP.

Pakistan

Quaid-i-Azam University — Department of Physics

Address: P.O. Box 1090, Islamabad, Pakistan. **Phone:** (+92 51) 829472; **Fax:** (+92 51) 210256.

Director/Head: G. Murtaza.

Number of Research Scientists: 17; **Number of Staff:** 11.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Atomic, Molecular and Laser Physics; Condensed Matter Physics (semiconductor physics, high temperature superconductivity, materials science and solid state theory); Particle and Nuclear Physics (theory); Plasma Physics and Controlled Nuclear Fusion.

Major Scientific Results or Products: 400 scientific papers published in about 15 years and about 200 papers presented in international scientific meetings.

Main Research Facilities Available: *Equipment:* Nd:YAG laser and dye laser; Fourier transform infrared spectrometer (FTIR); deep level transient spectroscopy system; high dispersion spectrography; X-ray diffractometer; plasma focus and theta pinch device. *Computers:* 10 286 basic computer systems.

Library: about 7000 books and about 40 physics research journals.

Future Development Plans: Expansion of activity in research areas cited above.

International Cooperation Arrangements: Federation arrangement with ICTP; affiliated centre with ICTP; International Science Programme, Uppsala University, Sweden; Bonn University and Ruhr University, Bochum through DAAD; Alexander von Humboldt Foundation, Germany; Imperial College, London.

Philippines

National Institute of Physics (NIP) — College of Sciences

Address: University of the Philippines, Diliman, Quezon City 1101, Philippines. **Phone:** (+63 2) 976061 - 69, 989676 ext. 6431, 6311; **Telex:** 2231 UPDIL PU; **Fax:** (+63 2) 996868.

Director/Head: Henry J. Ramos.

Number of Research Scientists: 35; **Number of Staff:** 13.

Scientific Fields of Interest: Materials; Physics/Astronomy.

Main Lines of Research and Training Activities: Materials Science; Instrumentation Physics; Laser Physics; Plasma Physics; Theoretical Physics.

Major Scientific Results or Products: Patents, inventions, reports and publications.

Main Research Facilities Available: High Tc superconductors facility; thin film deposition system with RHEED capability; general 80486-based and 80386-based minicomputers; high vacuum system for sealed CO₂ lasers; dye lasers; Ion source; plasma-enhanced chemical; chemical vapour deposition facility; library; machine shop.

Future Development Plans: Encourage lateral entry of faculty and researchers, acquire more sophisticated equipment, increase library volumes including journals, expand research space, invite postdoctoral researchers and visiting scientists.

Cooperation Arrangements with Developing Countries: Exchange of scientists as is currently being done with Japan and Australia, under South-South cooperation scheme.

Other International Cooperation Arrangements: Philippine Department of Science and Technology - Japan Society for Promotion of Science Exchange Programme in the Breeder Sciences, ADAP-IDP Programme with Australian Universities, Philippine-American Education Grants.

Turkey

Middle East Technical University — Department of Physics

Address: 06531 Ankara, Turkey. **Phone:** (+90 312) 2101281; **Telex:** 44441 ODTK TR; **Fax:** (+90 312) 2101281; **E-mail:** physics@newton.physics.metu.edu.tr.

Director/Head: Sinan Bilikmen.

Number of Research Scientists: 64; **Number of Staff:** 20.

Scientific Fields of Interest: Biology; Energy; Materials; Chemistry; Engineering/Technology; Environment; Marine; Mathematics; Physics/Astronomy/nonlinear dynamics.

Main Lines of Research and Training Activities: Condensed matter physics; high energy physics;

Astrophysics; Mathematical physics; Atomic and molecular physics; Plasma physics; Nuclear physics.

Main Research Facilities Available: Equipment for solid state physics, furnaces, ultrasonic bonder, transmission electron microscope, systems for coating, plasma deposition system; 4Ar and dye lasers, atomic beam spectroscope, spectrum analyser, beam splitters, electron beam evaporator; Equipment for ¹⁴C dating and thermoluminescence; DEC PCs workstations and terminals to mainframe computers; 8" and 16" Cassegrain telescopes; binocular stereo microscope for nuclear emulsion plates; equipment for plasma diagnostic and gas discharges, electron gun; black and white pyranometer, pyroheliometer; machine and electronics shops.

Future Development Plans: Purchase of a Raman scattering spectrometer, XRF and a UV-VI spectrophotometer, powerful lasers, and ESR spectrometer and liquid-He system.

Cooperation Arrangements with Developing Countries: Collaboration with Baku and Novosibirsk.

Other International Cooperation Arrangements: CERN: AVH (Alexander von Humboldt Foundation); ICTP: Fulbright; NATO: European Space Agency (ESA); Academic links with the University of Durham through the British Council, UK; Protocol with Darmstadt Technische Hochschule, Germany; Protocol with Saginaw Valley and Texas Tech. Universities, USA.

Uruguay

University of the Republic, Uruguay — Institute of Physics

Address: Faculty of Sciences, Tristan Narvaja 1674, 11200 Montevideo, Uruguay. **Phone:** (+598 2) 418004, 418005; **Fax:** (+598 2) 421957. **E-mail:** secifci@fisica.edu.uy.

Director/Head: Carlos Negreira.

Number of Research Scientists: 19; **Number of Staff:** 2.

Scientific Fields of Interest: Materials; Engineering/ Technology; Physics/Astronomy.

Main Lines of Research and Training Activities: Nonlinear physics: bifurcations and chaos; structures formation; experimental laser physics; linear and nonlinear spectroscopy of magneto-optically cooled atoms; experimental ultrasonic acoustics: elastic waves in solids; ultrasonic diffusion; gravitational physics; quantum relativity and lattice gauge theories. High energy physics; hadronic physics; physics and dynamics of minor bodies of solar system.

Major Scientific Results or Products: In 1993-1994, published 35 papers in international periodicals with peer review system (*Phys.Lett.B; J.Knot Theor.; Comm. Math. Phys; Phys; Phys. Rev. A, B, C, and D; Nucl. Phys.; Phys. Fluids; Optical Comm.; Chaos, Solitons and Comp.; Material Science Forum; Physica Scripta; J. Mol. Str. Thermochem.*).

Main Research Facilities Available: 6 workstations; 1 IBM 6000 Workstation RISC 20 HFLOPS; network of 35 personal computers; 1 specialized library (2200 books, 76 periodical titles); laboratory for ultrasonics (US\$ 300,000 in equipment); laboratory for optics (US\$ 200,000 in equipment); laboratory for teaching.

Future Development Plans: Creation of PhD in physics in Uruguay; establish more joint ventures with productive sector; strengthen the research in different fields.

Cooperation Arrangements with Developing Countries: Cooperation at different levels with about 25 institutions in Argentina, Brazil, Chile, Cuba, Mexico and Venezuela.

Other International Cooperation Arrangements: Cooperation with some 30 scientific institutions in Germany, Spain, USA, France, Italy, Portugal, Sweden and Switzerland.

Venezuela

Instituto Venezolano de Investigaciones Científicas (IVIC) — Centro de Física

Address: Apartado 21827, A-1020 Caracas, Venezuela. **Phone:** (+58 2) 5011474; **Fax:** (+58 2) 5011148; **E-mail:** marcano pion.ivic.ve.

Director/Head: Aristides Marcano O.

Number of Research Scientists: 20; **Number of Staff:** 14.

Scientific Fields of Interest: Physics/Astronomy.

Main Lines of Research and Training Activities: Theoretical physics; computational physics; solid state physics; low temperature physics; nonlinear optics and laser; molecular dynamics; semiconductor physics; neutron physics; high T_c superconductors; nonlinear organics.

Major Scientific Results or Products: About 170 scientific publications in fields mentioned above in past three years.

Main Research Facilities Available: 4 Spark-stations; Local electronic net; 50 PCs; Electronic microscope; Crystal growth facilities; YAG laser; N_2 laser; 2 Argon lasers; 2 dye lasers; low temperature facilities; EPR-system; NMR-system; 3 magnets; 5 vacuum systems; 4 spectrometers; 1 Faraday cage; neutron diffractometer; 3 MW nuclear reactor.

Future Development Plans: Improve solid state experimental facility; improve computational facilities; improve applied and experimental facilities.

Cooperation Arrangements with Developing Countries: Cooperation with Mexico, Argentina, Cuba, Brazil, Colombia and Chile. Planned cooperation with Caribbean nations, Central America, Peru, Ecuador and Uruguay.

Other International Cooperation Arrangements: Cooperation with several institutions in USA (eg, Lawrence-Berkeley Laboratory, Maryland University, Florida University); France (Université Franche-Comté); Netherlands; former Soviet Union.

Vietnam

National Centre for Science and Technology of Vietnam — Institute of Materials Science (IMS)

Address: P.O. Box 607, Bo Ho, Hanoi, Vietnam. **Phone:** (+84 4) 352129; **Telex:** 411525 NCSR VT; **Fax:** (+84 4) 8352483; **E-mail:** nvhieu@ims.acvn.

Director/Head: Nguyen Van Hieu.

Number of Research Scientists: 200; **Number of Staff:** 150.

Scientific Fields of Interest: Materials; Chemistry; Physics/Astronomy.

Main Lines of Research and Training Activities: Electron materials and devices; Optical materials and technologies; Rare elements and rare earth materials; Polymers and composite material; High quality steels and alloys; Mineral processing and environmental technologies; Catalysis and petrochemistry; Corrosion and corrosion prevention; Materials from marine resources; Inorganic materials; Equipment.

Major Scientific Results or Products: Scientific publications; Technologies (patents).

Cooperation Arrangements with Developing Countries: Cooperation agreements with laboratories of CSIR in India and of Research Councils of Asian countries.

Other International Cooperation Arrangements: Affiliated centre of ICTP; cooperation agreements with laboratories of CNRS, France and of the Russian Academy of Sciences, and others.

National Centre for Science and Technology of Vietnam — Institute of Physics

Address: P.O. Box 429 Boho 10000, Hanoi, Vietnam. **Phone:** (+84 4) 347206; **Telex:** 411525 NCSR VT; **Fax:** (+84 4) 352483.

Director/Head: Dao Vong Duc.

Number of Research Scientists: 100; **Number of Staff:** 30.

Scientific Fields of Interest: Energy; Materials; Engineering/Technology; Earth Sciences; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Microstructure of matter: Quantum field theory, theory of elementary particles, Nuclear physics, theory of condensed matter; Physical properties of materials: optical and electromagnetic of properties of Solids; Physics and techniques of lasers; electronic, communication and telecommunication techniques. In collaboration with other research institutions and enterprises, the Institute organizes the application of the laboratory research results to the needs of the country. International cooperation in research on physics and transfer of High Technology to Vietnam by means of exchanges of scientists setting up common collaboration organizing conferences, workshops.

Major Scientific Results or Products: Scientific articles and reports published in International and National journals (30 per year on average), prototypes of high technology devices and instruments for scientific research and industry (lasers, software, sensors).

Main Research Facilities Available: Library with several thousand books and several dozen of periodical journals (incomplete volumes), PC computers (AT 286, 386, 486), (one per six scientists), specific equipment for laboratories from different donors, USSR (former), Germany, USA, France (not compatible), current awareness products for microcomputer.

Future Development Plans: Continue carrying out research programme on fundamental problems: microstructure of matter, material science, particularly physical properties of materials from local resources need by the country; manufacture optimal electric solar batteries, plastic collectors, improve research facilities from different possible sources.

Cooperation Arrangements with Developing Countries: Exchanges of scientists, scientific information; establish common laboratories; organize international and/or regional conferences, workshops, seminars.

Other International Cooperation Arrangements: Organize international conferences, workshops, seminars; exchange of scientists with CNRS (France), DAAD (Germany), Sida (Sweden), and various other science academies.

Zimbabwe

University of Zimbabwe — Department of Physics

Address: M.P. 167, Harare, Zimbabwe. **Phone:** (+263 4) 303211 ext. 1417; **Telex:** 26580 UNIVZ ZW; **Fax:** (+263 4) 333407; **E-mail:** mutanga@zimbix.uz.zw.

Director/Head: S.A. Mutangadura.

Number of Research Scientists: 15; **Number of Staff:** 5.

Scientific Fields of Interest: Physics.

Main Lines of Research and Training Activities: Programmes for BSc, MSc, MPhil and DPhil degrees; main lines of research include design and fabrication of gas lasers and plasma devices and their applications; manufacture of low cost equipment; use of PLDs in research instruments; characterization of electrical and magnetic properties of thin, thick and composite films; fabrication of amorphous solar cells; study of plasma dynamics; paleomagnetism; gravity survey; aeromagnetic data modelling; high energy physics and quantum chaos.

Major Scientific Results or Products: Fabrication of N₂ gas laser, curve tracer, driver torsion oscillator, pulsed control electronic devices, and power supplies completed; N₂ gas laser used to study dextrinization of starch; characterization of N₂-laser; ecoband 60L/shell E980 composite material completed.

Main Research Facilities Available: Rotary vacuum pump; diffusion pump; 2mW He-Ne laser; 100 kW nitrogen laser; 32 F capacitor bank; thermal evaporation thin film coating unit; 50 MHz oscilloscopes; Epeley precision pyranometer; PAR fast spinner magnetometer; Molspin slow spin magnetometer; SI 2 magnetic susceptibility meter; MTTD thermal demagnetizer; A.F. demagnetizer; La Coste Rombery gravity meter; Terraloc seismograph; Mac Ohm resistivity meter; proton magnetometers; E M Max-Min; E M Tuam; I P Syntrex; spectrometers; 286, 386 and 486 computers.

Future Development Plans: Fabrication of tunable dye laser, CO₂ laser; applications of N₂ laser in studying environmental pollution, medicine, trace element detection and LIF studies of plants with special reference to drought stress and deforestation; study of plasma focus with special reference to fusion reaction and plasma dynamics, enrich standard of condensed matter/solar energy laboratory, low cost equipment for postgraduate and research develop computer interfacing techniques; University of Zimbabwe plans to install a campus network that will provide electronic mailing facilities.

Cooperation Arrangements with Developing Countries: Interested in collaborating with Center for Advanced Technology, Indore, India.

Other International Cooperation Arrangements: Establish suitable links with University of California at Los Angeles (UCLA), Agricultural University (Wageningen, Netherlands), the University of Graz (Austria), and University of Paris (France).