

# CENTRO INTERNACIONAL DE FÍSICA



[www.cif.org.co](http://www.cif.org.co)



# CIF

**Mission:** Promote basic and applied research, specially in physics and industrial and technological development in Colombia and the Andean and Caribbean countries.

## **Objectives:**

- Development of basic and applied research
- Scientists training
- Industrial technological development and innovation
- Introduction of new technologies in the country
- Creation of knowledge-based industries (spin offs)

# CIF STRENGTHS

- ◉ High level and qualified basic research
- ◉ Experience in technological development
- ◉ Interdisciplinary professional team able to provide integrated solutions
- ◉ Administrative flexibility

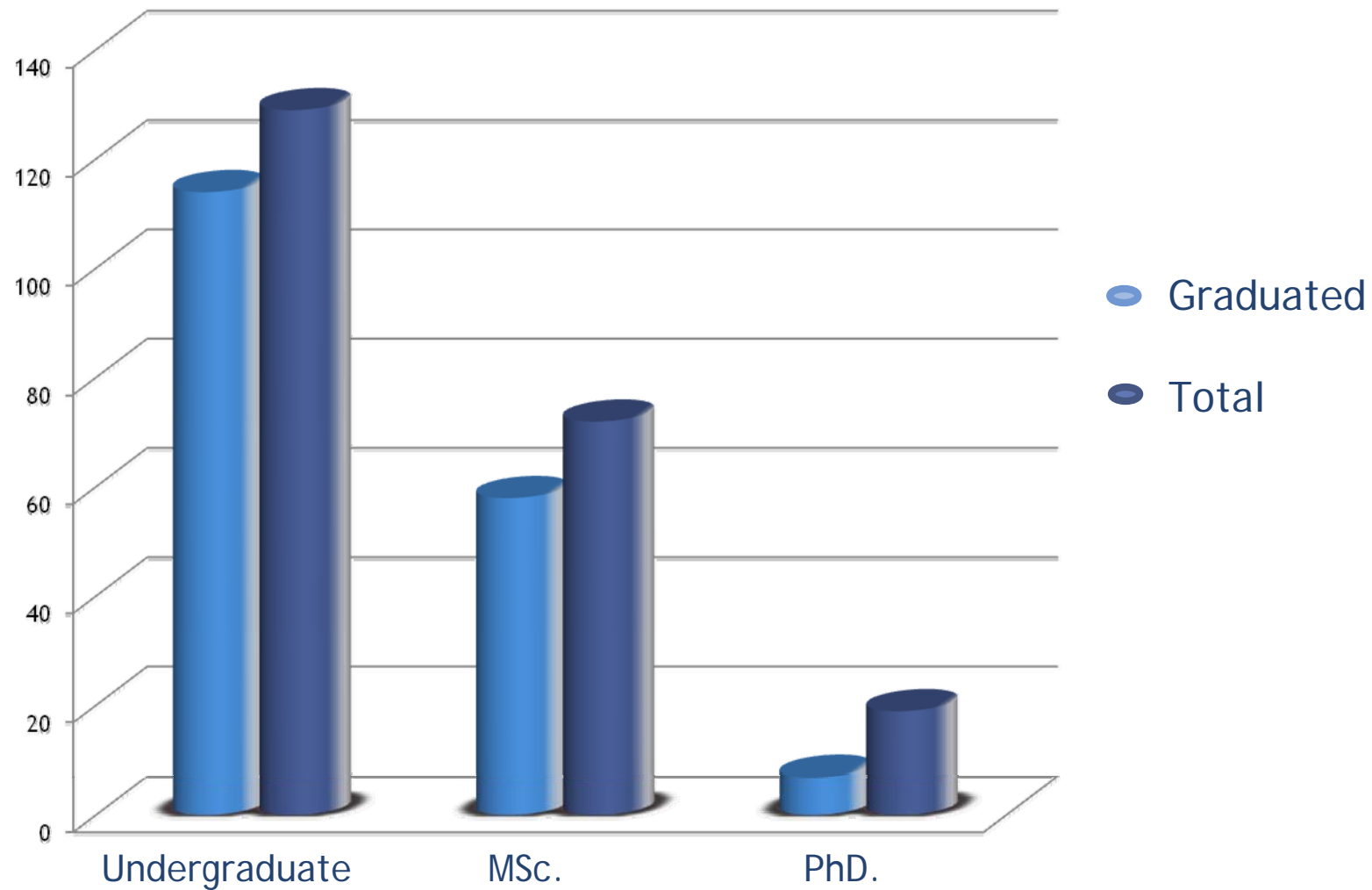
## RESULTS SINCE 2000

- 80 technological products obtained through contracts with industry
- 3 spin-offs. 2 more in process
- 208 international and national publications
- 140 scientists trained :
  - ✓ 30 Ph.D
  - ✓ 40 MSc.
  - ✓ 70 Undergraduate - young researchers
- 36 R+D projects completed
- 2nd place among 60, in the last evaluation of research centers in Colombia

## ACIF-CIF Training (1985 - 2011)

Total events	215
Lecturers	1650
Local participants	8500
International participants	1800

# Researchers training (1995 - 2011)



## Scientific Production (1995-2011)

Scientific papers	200
Proceedings	110
Books	7
Patents	5

## Production (1995-2011)

Finished projects	80
Technological Products	45
National Cooperation agreements	40
International cooperation agreements	30



# CIF TEAM - 2011

Full time scientists	28
Part time scientists	11
Administrative	5
Management	4
PhD. MSc. And undergraduate students	40
TOTAL CIF	88

# CIF's GROUPS

## BASIC RESEARCH

- Biophysics and membranes biology
- Optics
- Materials
- Nuclear Physics - U. Nacional



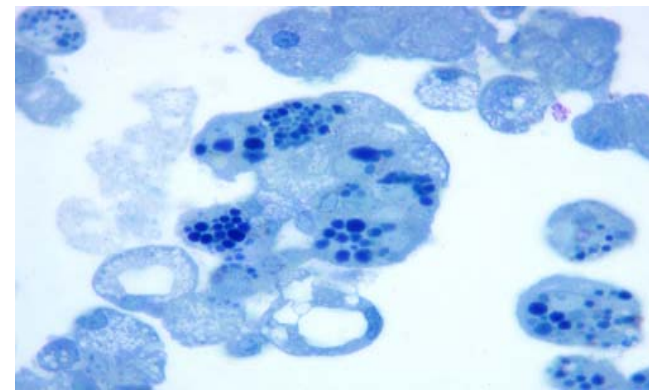
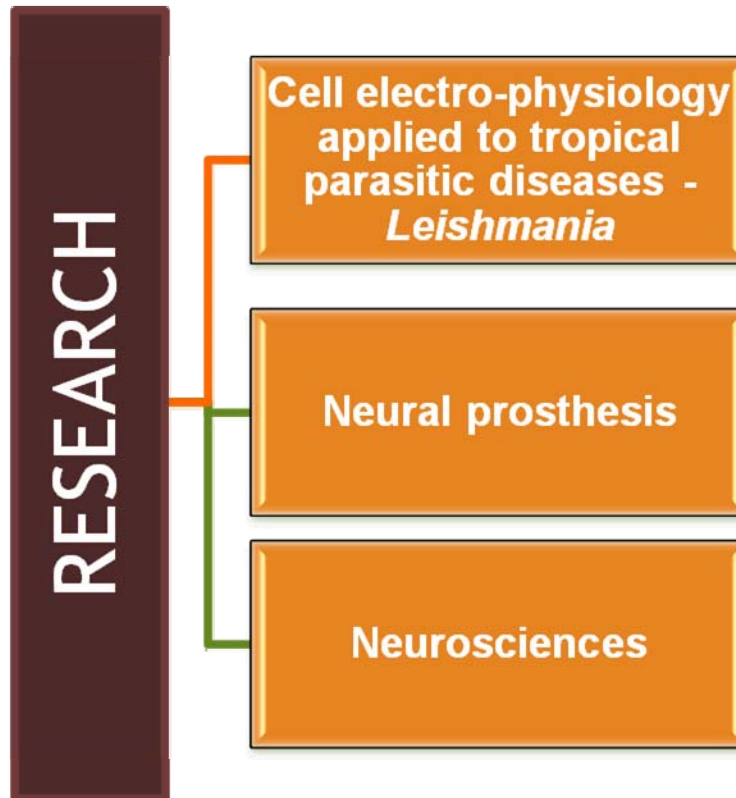
## APPLIED RESEARCH AND TECHNOLOGICAL DEVELOPMENT

- Applied Physics and Tech. Development
- Biotechnology



## PROJECT MANAGEMENT

# BIOPHYSICS AND MEMBRANE BIOLOGY



Director: PhD. Marcela Camacho

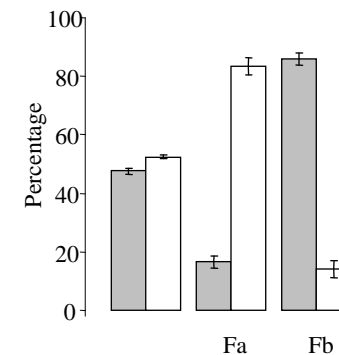
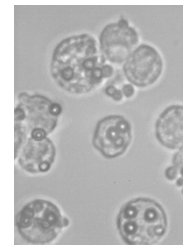
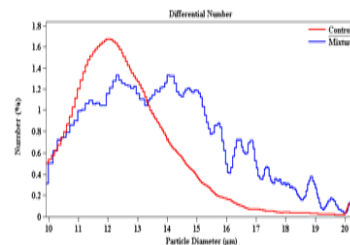
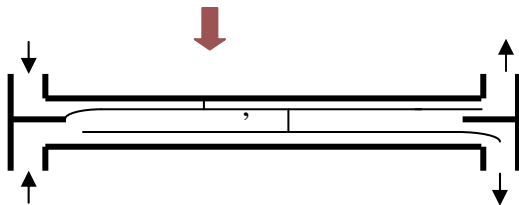
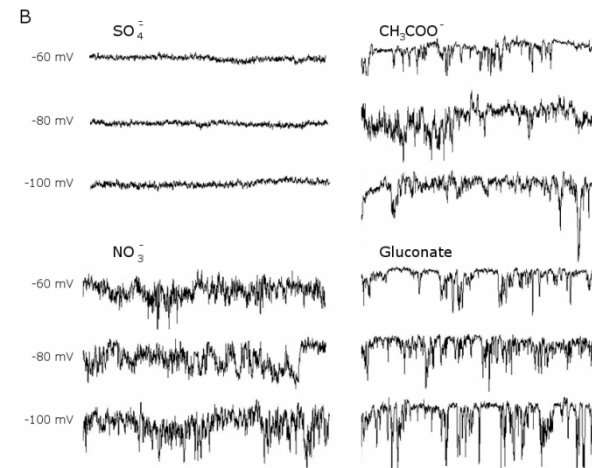
Main researchers :PhD. Clara Spinel, PhD.Enrico Nassi, PhD.Maria del Pilar Gómez

## PROJECTS - 2011

- Functional characterization of *Leishmania* ClC ion channel
- Membrane studies of the *Leishmania* parasitophorus vacuole
- *Leishmania* chloride channels, potential therapeutic target
- Melanopsin mediated transduction in unconventional photoreceptors

# SOME RESULTS

- Theoretical Analysis of ion currents.
- Method to separate cells, intracellular organelles, etc.
- Membrane permeability in the model *Leishmania*-macrophage.
- Ion currents detected on the *Leishmania* parasitophorus vacuole.



# NUCLEAR PHYSICS\*

Director: PhD. Fernando Cristancho

## RESEARCH

Nuclear structure

Interaction of radiation  
with matter

Applications of nuclear  
techniques to detection  
of “anti-personal mines”



**\*UNIVERSIDAD NACIONAL DE  
COLOMBIA**



# RESULTS AND NEW PROJECTS

- ◉ Study of the nuclear continuum at high intrinsic excitation energy and high spin.
- ◉ Applied nuclear physics developing devices able to locate buried objects using neutron and gamma backscattering techniques.



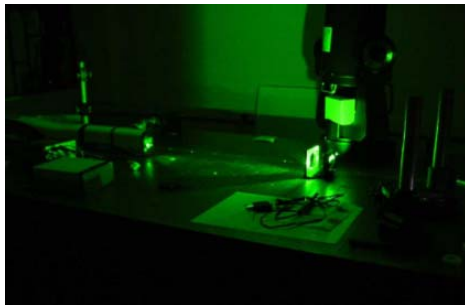
R&D Project on analysis and design of nuclear methods for detection of «anti-personal» mines.  
Stage II: development of field test prototype

# OPTICS

LIDAR: Laser  
Imaging  
Detection and  
Ranging

Holography

Thermal  
treatments



# MATERIALS

Production of Titanium  
and Zirconium Nitride  
thin films

Nanotechnology

Cathode Pulverization  
CD y RF

Production of fullerenes  
and nanotubes for  
medical applications

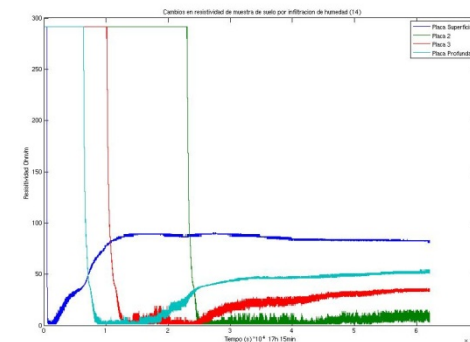




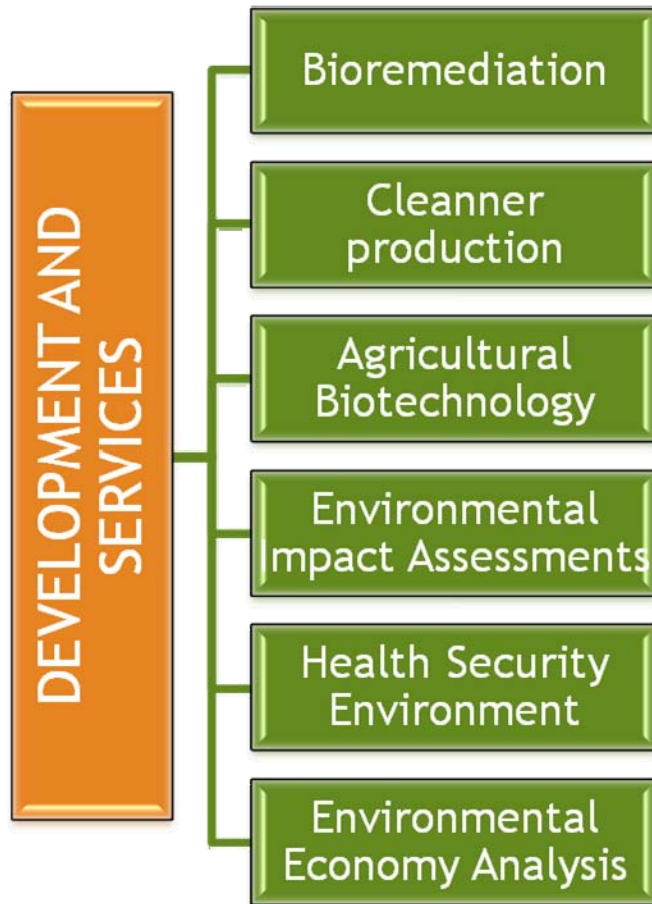
# RESULTS 2010

## MEASUREMENT OF MOISTURE IN SOIL AND MONITORING OF NANOPARTICLES

- Nanotechnology applications for agricultural purposes using colloids as a support for transportation of pesticides for plant protection
- Integrated Electrical Measurements of Soil designed to measure solute penetration and to know the percentage of moisture at the depth of irrigation from surface.

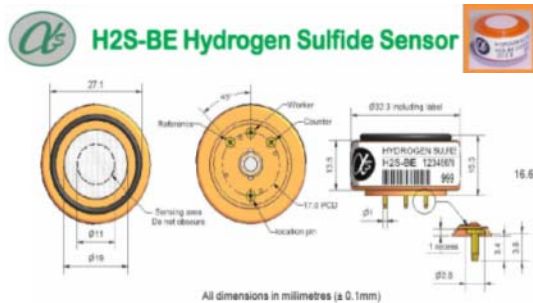
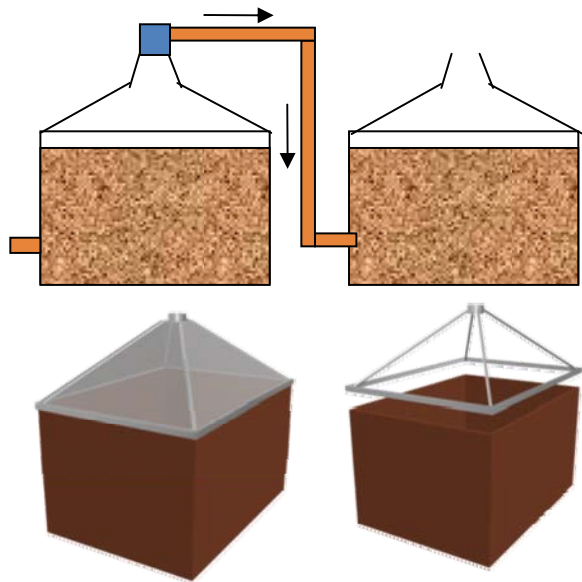


# ENVIRONMENTAL BIOTECHNOLOGY

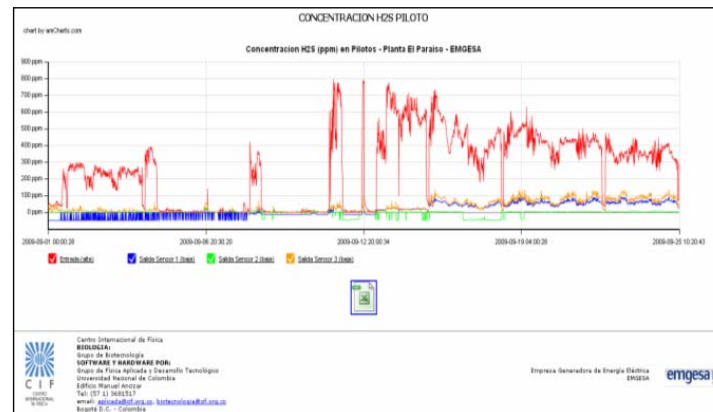


# RESULTS - 2010

## BIOFILTRATION SYSTEM



Hydrogen sulfide biofiltration system. Design, construction and monitoring



PRODUCTS

# RESULTS - 2010

## Development of a Productive Reforestation Model



APRM

Flexible

Replicable

Low-cost model

High social and environmental impacts.





# NEW PROJECTS - 2011

## OPTIMIZATION OF SNAKE ANTI-VENOM SERUM PRODUCTION

**LABORATORIOS  
PROBIOL S.A.**  
Fundador: Dr. César Gómez Villegas  
[www.probiol.com](http://www.probiol.com)



- ❑ Processes optimization,  
*Laboratorios Probiol S.A.*
- ❑ Analysis and evaluation -  
productive chain
- ❑ Enhance ophidic accident  
treatment alternatives



## NEW PROJECTS - 2011

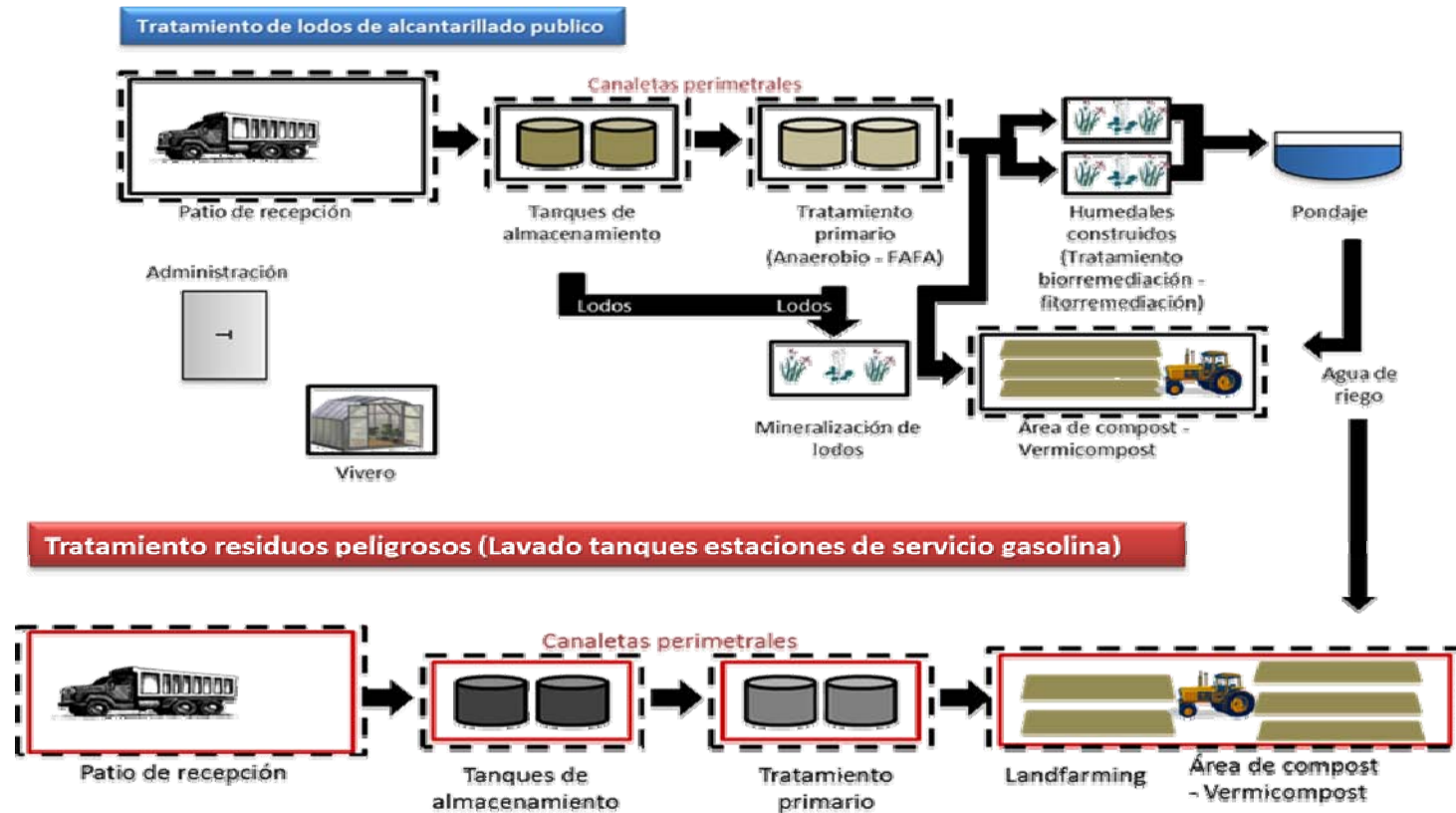
Technical support to create a compensation fund and implementation of RSPO criteria in Aceites Manuelita SA plantation (Casanare – Orinoco grasslands)



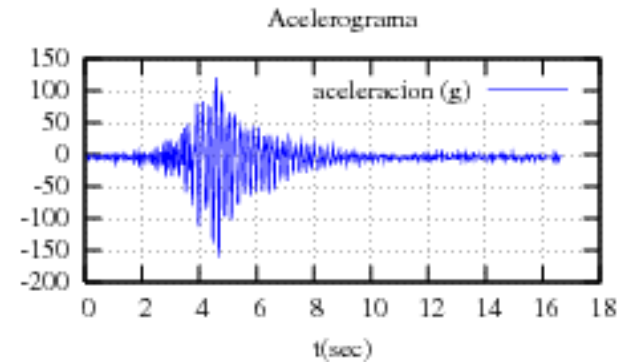
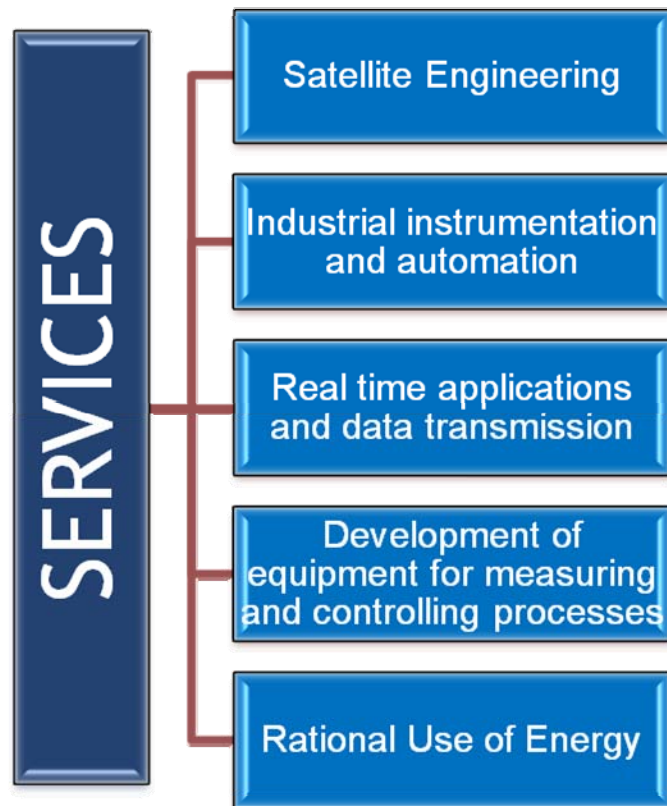
# NEW PROJECTS - 2011

## Industrial sludge management - Spin off

Services of remediation and final disposition of two types of residues contaminated with hydrocarbons.

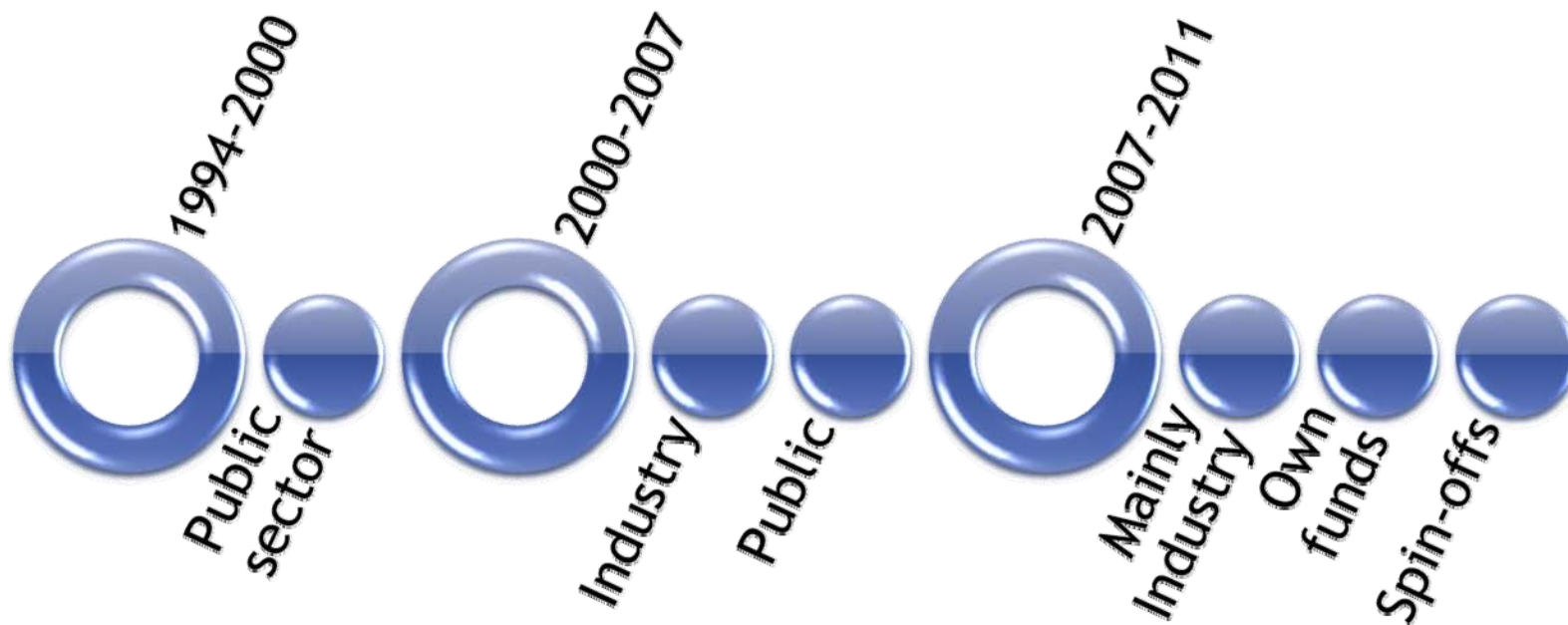


# APPLIED PHYSICS AND TECHNOLOGICAL DEVELOPMENT





# FUNDING OF TECHNOLOGICAL ACTIVITIES



# RESULTS

- ◆ Measuring and analysis equipment developed for the electrical sector
- ◆ More than 200 instruments produced and installed
- ◆ Technological solutions for Colombian industries
- ◆ Design of specialized electronic instrumentation and software
- ◆ Production of small series of devices
- ◆ Strengthening of the relationship with industry
- ◆ Research and development training

# MONITORING OF ENERGY QUALITY- SCAN POWER

The Scan Power System was designed according to CREG Resolution 024-2005



# METHANE GAS MEASUREMENT IN COAL SAMPLES - CANISTER

Automation of measurement systems with applications in mining and analysis of methane gas



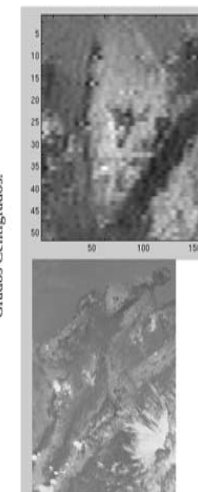
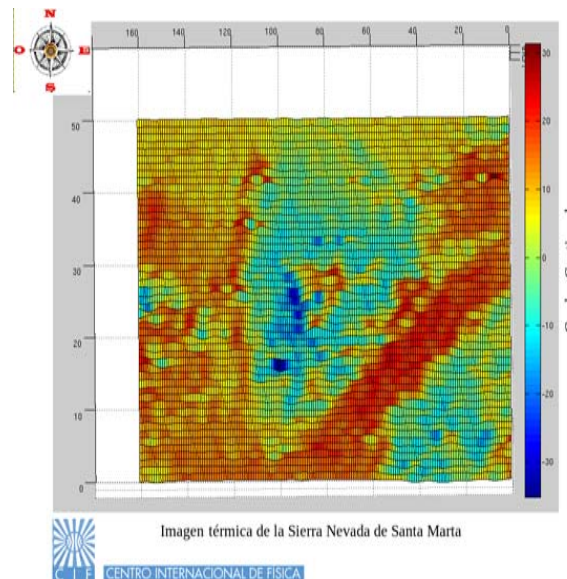
# COLOMBIAN EARTH OBSERVATION SATELLITE



## Projects

- ✓ Satellite Earth Station
- ✓ Spectral radiometer
- ✓ Stage II: Topographical LIDAR

- Technical specifications
- Negotiation capacity



Detalle en infrarrojo lejano de la Sierra Nevada.

Sección de Colombia Infrarrojo Lejano.  
Marzo 30, 2009



# PROJECTS 2011

## PRODUCTION

- Power Quality - Scan Power (2 projects)
- Telemetry (10 projects)
- Meterologic applications (FAC-5 projects)

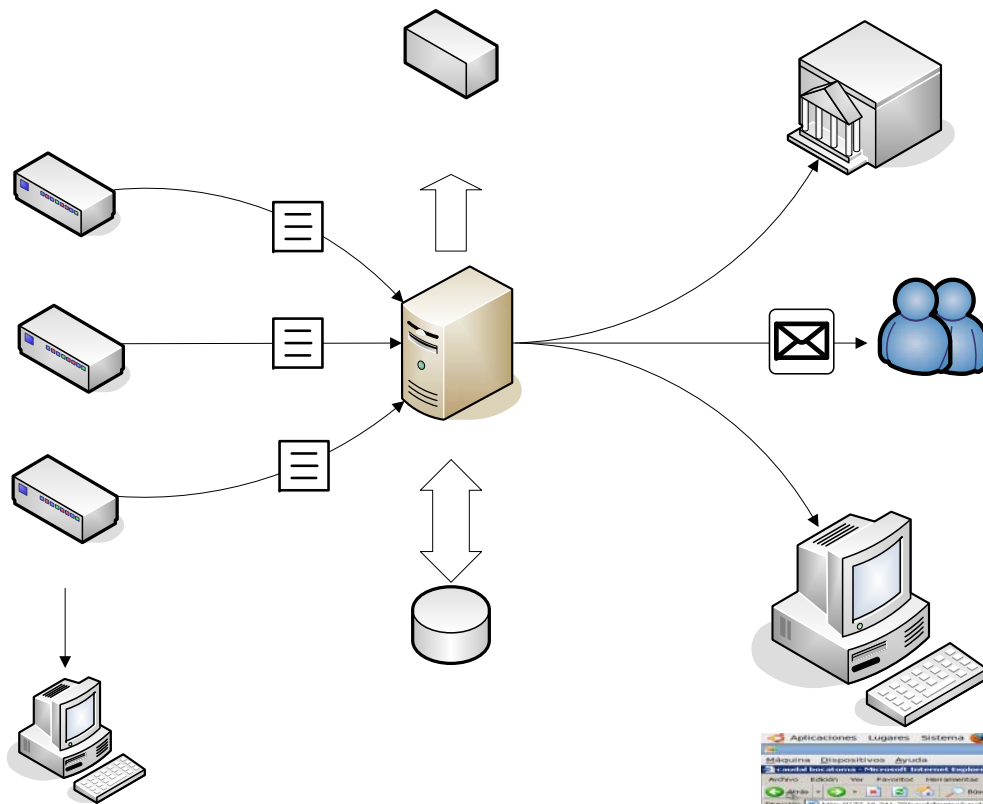
## DEVELOPMENT PROJECTS

- Inclination meter (ISA)
- High voltage line load meter (CODENSA)
- Meter test equipment (CODENSA)
- Telemetry (EPSA)

## PLATFORM TECHNOLOGY

- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| • Data Acquisition System             | PLC                                   |
| • Mesh Network Protocol               | • Microcontroller AVR (8 and 32 bits) |
| • RF communication protocol           | • Scan Power Version FPGA             |
| • Embebed Linux Board Support package | • Data analysis                       |
| • Power Line Communications           | • Electronic Design                   |

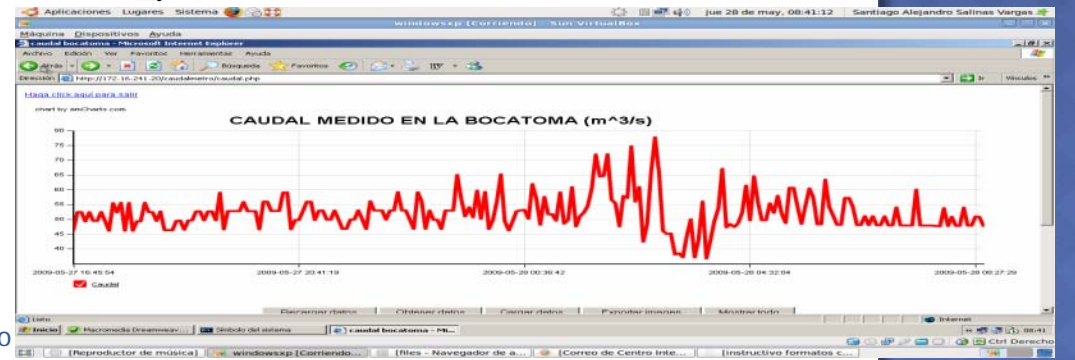
# TELEMETRY SYSTEMS



Monitoring applications to measurement of:

- Energy, gas and water consumption
- River flows
- Oil and gas well production
- Others

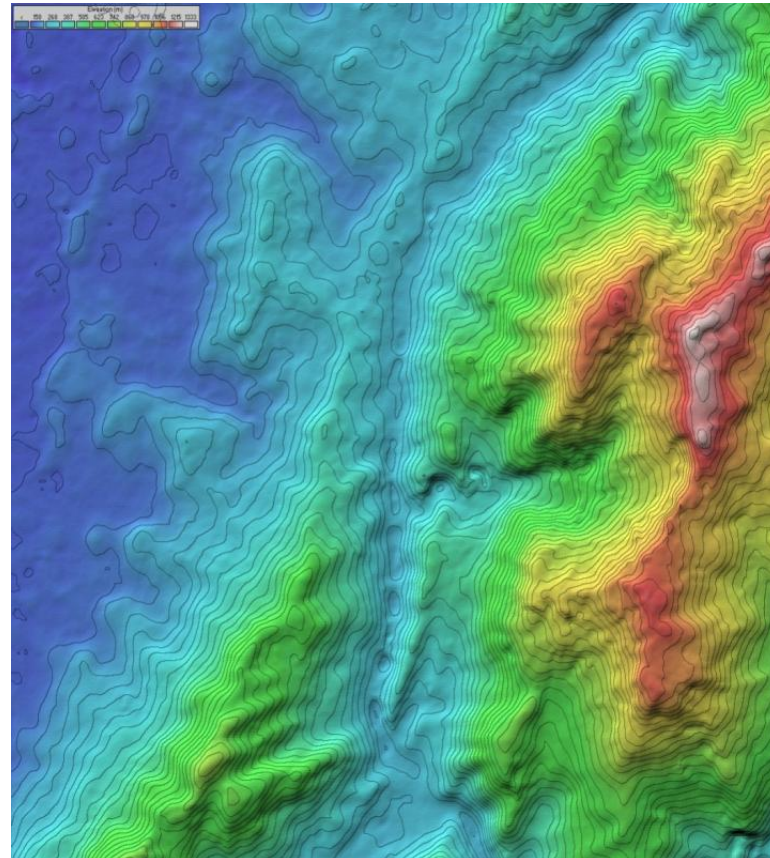
PRODUCTS



# CIF AND COLOMBIAN AIR FORCE (FAC) COOPERATION PROJECTS

Meteorological  
applications:

- Design of the Software  
SIMFAC v.2.0
- Earth Stations assembly  
(NOAA - GOES)
- Number modeling
- Meteorological Stations  
assembly





# TECHNOLOGICAL-BASED INSTITUTIONS AND SPIN-OFFS

## PROMOTED

- CIC. Corporación para la Investigación de la Corrosión - *Corrosion research corporation* -
- TECLASER. Use of laser in precision cuts
- AIDETEC. Electronic EQ production
- REXCO. Vacuum

## NEW PROJECTS

- Sludge management services
- Energy analysis services (consumption and quality)

# INTERNATIONAL COOPERATION

- COMSATS
- ICTP
- TWAS
- Max Planck Institute
- Ecole de Physique et Chimie, Paris
- Paris VI
- NWY, Biophysics Institute
- Woodsdhole

# TRENDS AND NEW PROJECTS

CIF has increased and strengthened its scientific and technological capabilities. This experience makes it easier to reach new fields for R+D in strategic areas for our country and the region.

Since we consider knowledge produced through R+D a key factor to development, therefore, our efforts are concentrated on the economic, environmental and social impacts derived from our activities.

# NETWORKING

Association with 5 Centres with similar characteristics:

- Complementary research fields
- High scientific and technological level
- Regional location and international recognition



INSTITUTO DE CAPACITACIÓN  
E INVESTIGACIÓN DEL  
PLÁSTICO Y DEL CAUCHO

18 años