

**ANNUAL REPORT  
INSTITUT FOR SPACE STUDIES  
OF  
CATALONIA  
1997**

# 1 INTRODUCTION

The Institute for Space Studies of Catalonia -IEEC- was created with the objective of conducting most of the research activities that are carried out in Catalonia, in the field of space science and technology and this has converted it into an internationally recognised centre.

The multidisciplinary character of these studies, their cost, and the existence of previous groups that work in this field in several institutions located in Catalonia, suggested to give to this Institute a “without walls” character, so that all groups that desire can join it, avoiding duplicity and acquiring, as soon as possible, a critical volume that will enable it to be operative.

With the purpose of giving it consistence, this Institute had to be articulated around a central block that received not only the Institute administration, but also an important portion of its researchers, which contribute the core of the centre’s activities.

During the year 1996, thanks to agreements with CSIC, a first group of four researchers were incorporated in the Institute. Immediately, because of the agreements achieved in July of 1997, 2 Cathedratics and 1 Full Professor of Universitat de Barcelona as well as 2 Full Professor and 2 Full Professors of the Universitat Politècnica de Catalunya were incorporated in IEEC. The incorporation of other researchers from the Universitat Autònoma de Barcelona in 1998 has not yet been settled. The addition of 3 researchers linked to IEEC, together with the contracted personnel in charge of projects and predoctoral award holders would mean that the total number of working people in IEEC would be 30 the 31st December of 1997, whith only four (including the computer system administrator) dedicated to administration and research support tasks. Then, taking into account the 13 peepole in its scientist pool and 3 in management during 1996, 1997 can qualify as the year of “the increase” of the Institute.

This acumulation of human resources has translated into a qualitative and quantitative jump in the Institute’s activities. On one hand, the number and economic weight of the projects in which the Institute is involved have increased and, on the other hand, it has been able to play a better role in the relevant areas of research and technology development. In this sense, we want to emphasize our participation in viability’s studies and definition of specificaton for the missions PLANCK, GAIA, EUROMOON and MARSEXRESS of ESA, the studies in phase A of the experiments DOPA and SIXE in the platform MINISAT02 of INTA, and in several studies on the use of receivers GPS for atmospheric soundings.

Apart from these activities, a great effort has been put to promote activities in the area of Earth’s Observation from satellites. In this sense, we remark the awareness for the need of the creation of an interdisciplinary group including partners from several institutions, coordinated by the IEEC, to study oceanographic applications of altimetric radars on board of TOPEX/POSEIDON, ERS and ENVISAT satellites, the collaboration with teledetection centers in Toulouse or the study that has done near the Institute Cartographic of Catalonia about characteristics that a minisatellite would need tohave to observe the Earth with high resolution.

## 2 GENERAL OBJECTIVES

Space research is very extensive and varied: astronomy, medicine, law, Earth's observation, new materials' research and many aspects of engineering are good examples. For efficiency reasons, the IEEC's activities are, in this initial stage, based in 3 large areas: Earth's sciences, Cosmos' sciences and Planetary Sciences which provides a connection between the first two. Later, if the circumstances advise it, the IEEC will explore new fields of activity. Inside each area, there are different lines of work. In every line, we are trying to develop, with harmony, the research aspects (basic and applied) and technological aspects in a manner that both of them come out stronger, namely, producing synergy.

These are the present lines of work:

- Earth's sciences:
  - Applications of the Global Positioning Systems.
  - Radar Altimetry and its applications (in developing phase).
  
- Cosmos' sciences:
  - Astrophysics of High Energies.
  - Stellar and Galactic Astrophysics.
  - Cosmology and Applied Mathematics to Space.
  
- Planetary sciences (in development phase).
  - Science and Planetary Engineering.
  - Physics of the Sun-Earth System.

### 3 STRUCTURE

These are the institutions that take part in the Patronage of Institute for Space Studies of Catalonia:

- Fundació Catalana per a la Recerca
- Universitat de Barcelona
- Superior Council of Scientists Investigations
- Universitat Autònoma de Barcelona
- Universitat Politècnica de Catalunya

#### 3.1 PATRONAGE

The Institute for Space Studies of Catalonia has the status of a private non-profit foundation. Its government, administration and representation of Institute is the Patronage, which is composed by: a) President, Vice-president, Secretary and Director of The Fundació Catalana per a la Recerca, b) Universitat de Barcelona's Management, c) Superior Council of Scientists Investigations' President, d) Universitat Autònoma de Barcelona's Management, e) Universitat Politècnica de Barcelona's Management.

Over the year 1997 two changes have been occurred in the Patronage's sinus. Because of the renunciation of Honourable Gentleman Macià Alavedra to the Patronage's presidency of Fundació Catalana per a la Recerca and his substitution by Hble. Gentleman Xavier Trias who has passed to preside the IEEC's Patronage, anyway and because of the renunciation of Excm. and Mag. Managing Dr. Gabriel Ferraté of his charge of Vice-President of Fundació Catalana per a la Recerca, the charge of Vice-President of IEEC's Patronage has remained vacant. Albert Serratosa is now acting Vice-President, in the interim, waiting for a new Vice-President's nomination of FCR.

##### **Patronage IEEC's composition in 31st December of 1997**

- Hble. Mr. Xavier Trias - President
- Dr. Albert Serratosa - acting Vice-President
- Excm. and Mag. Dr. Antoni Caparrós
- Excm. and Mr. Dr. César Nombela
- Excm. and Mag. Dr. Carles Solà
- Excm. and Mag. Dr. Jaume Pagès
- Dr. Josep A. Plana - Managing Director
- Dr. Albert Serratosa - Secretary

#### 3.2 SCIENTIST COMMISSION

The Patronage is advised by the Scientist Commission, which is formed by scientists and institutions' representatives, public or private entity's representatives of recognized prestige in the scientific, cultural, economic and social world. The nomination is for four years and is not renewable. Their functions is to evaluate the qualitative and suitability of IEEC's job constantly.

### Scientific Commission's composition of IEEC in 31st December of 1997

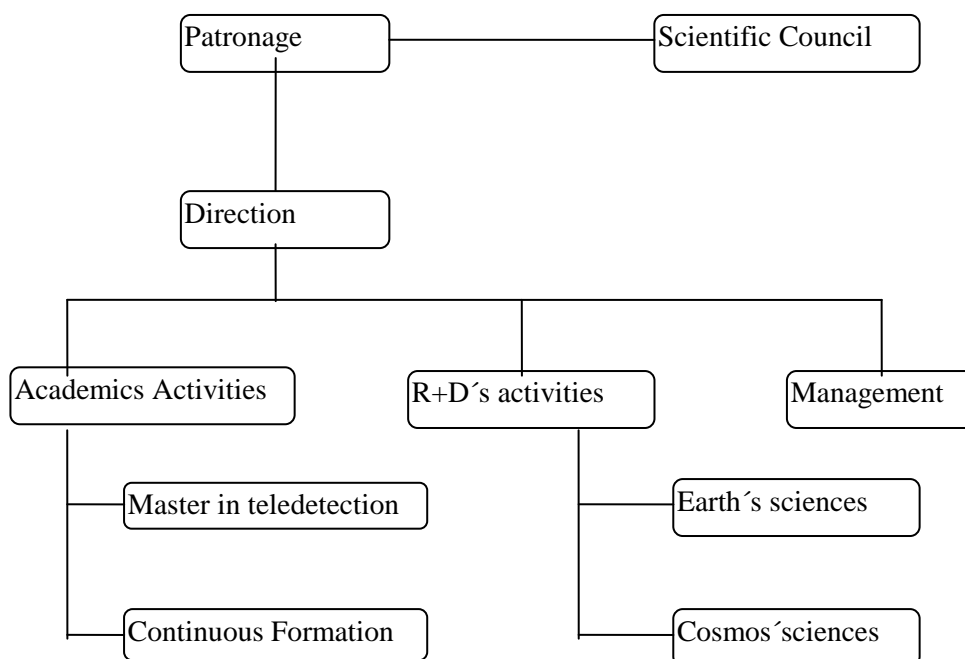
- Dr. A. Accensi (ESA) .- President
- Dr. E. Banda (CSIC)
- Dr. M.A. Lagunas (UPC)
- Dr. J. Miranda (ICC)
- Dr. J. R. Morante (UB)
- Mr. M. Pastor (NTE)
- Dr. T. Roca (IAC)
- Dr. J. Torres (INTA)
- Dr. J.J: Villanueva (UAB)
- Dr. J. Isern (CSIC) - Secretary

### 3.3 DIRECTOR

The execution of Patronages' agreements, management and general working of the Institute correspond to the Institute's Director.

- Dr. J. Isern

### 3.4 ORGANIZATION CHART



## **4 PERSONNEL**

The IEEC's personnel is formed by approved investigators from institutions's which form part of the Patronage, contracted researchers funded by projects and award-holders. Moreover, it should be mentioned that the IEEC has received numerous visits from researchers during the year.

The next facts reflect the situation in 31st December of 1997.

### **4.1 SCIENTIFIC PERSONNEL**

1. Asiaín, Ricard (UB), Contract by project
2. Bravo, Eduard (UPC), Full Professor E.U.
3. Canal, Ramon (UB), Cathedratric
4. Cucurull, Lúdia (IEEC), Contract by project
5. De Paco, Pedro (IEEC), Contract by project
6. Elizalde, Emili (CSIC), Scientific Investigator
7. Elósegui, Pedro (CSIC), Contracted Investigator
8. Flores, Alejandro (CSIC), Contracted by project
9. Fosalba, Pablo (CSIC), Award- holder DGICYT
10. Galadí, David (IEEC), Contract by project
11. García- Berro, Enrique (UPC), Full Teacher
12. Gaztañaga, Enrique (CSIC), Contracted Investigator
13. Gómez Gomar, Jordi (IEEC), Contract by project
14. Hernanz, Margarida (CSIC), Scientific Collaborator
15. Isern, Jordi (CSIC), Investigator's Teacher
16. José, Jordi (UPC), Full Professor E.U.
17. Martínez- Benjamín, Joan Josep (UPC), Full Professor
18. Rius, Antoni (CSIC), Scientific Investigator
19. Romeo, August (CSIC), Award- holder Post- Doctoral CIRIT
20. Ruffini, Giulio (CSIC), Contract by project
21. Sanahuja, Blai (UB), Cathedratric
22. Sedó, M<sup>a</sup> José (IEEC), Contract by project
23. Torra, Jordi (UB), Full Professor

### **4.2 ADMINISTRATIVE AND SUPPORT PERSONNEL IN 31st DECEMBER 1997**

1. Arenillas, Carme (IEEC), Secretary (Vacancy in 31st December of 1997)
2. Camps, Pilar (IEEC), Manager
3. Guerrero, Josep (IEEC), System Manager
4. Montes, Pilar (IEEC), Secretary (Join the 16th December of 1997)
5. Morillas, Sandra (IEEC), Administrative in practics (Vacancy in 15th November of 1997)

### **4.3 LINKED PERSONNEL**

1. Casanova, Ignasi (UPC), Contracted Doctor
2. Gràcia, Violeta (UPC), Research Student
3. Llorca, Jordi (UB), Associated Teacher

#### 4.4 IEEC PERSONNEL'S CHARACTERISTICS

##### Distribution by Areas

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Direction.....	1
Economics services and administrative.....	4
Earth's Sciences Areas.....	8
Cosmos' Sciences Areas.....	14
Linked Personnel.....	3

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**Total.....30**

##### Generals Characteristics

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	Men	Women	
Doctors.....	17.....	16.....	1
Licenciate/ Engineers.....	11.....	7.....	4
Average Rate.....	1.....	-.....	1
Professional Studies.....	1.....	-.....	1

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**Total.....30.....23.....7**

**Average age: 36,3**

### STAFF DISTRIBUTION ACCORDING TO FINANCIAL SOURCES

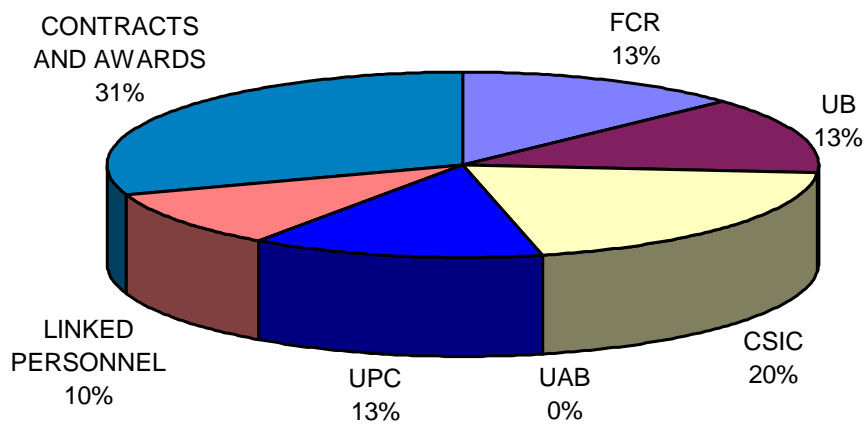


Figure-1-

TOTAL: 30



#### 4.5. VISITORS

1. Salaris, Maurizio (Max- Planck Institut für Astrophysik, GERMANY), from 28 october to 28 february 97.
2. Granada, Francesc (LIME - Univ. Joseph Fourier, Grenoble, FRANCE), from 15 december 96 to 15 april 97.
3. Frieman, Joshua A. (Fermilab & University of Chicago, USA) from 1 to 14 february 97.
4. Ziesche, Falk (Physic Department, Jena University, GERMANY), from 18 to 26 february 97.
5. Coc, Alain (Spectrométrie Nucléaire et de Spectrométrie de Masse Center - Orsay, FRANCE) from 18 to 23 march 97; from 1 to 6 april 97 and 28 september to 12 october 97
6. Thibaud, Jean Pierre (Spectrométrie Nucléaire et de Spectrométrie de Masse Center - Orsay, FRANCE) from 18 to 20 march 97.
7. Gracia- Bondia, J.M. (Physic Department, University of Costa Rica, COSTA RICA), from 9 to 12 april 97.
8. Lacey, Cedric (Theoretical Astrophysics Center - Copenhagen, DENMARK) from 26 april to 12 may 97.
9. Wiescher, Michael (University of Notre Dame, Indiana, USA) from 11 to 15 may 97.
10. Frieman, Joshua A. (Fermilab & University of Chicago, USA) from 26 may to 6 june 97.
11. Naya, Juan Emilio (NASA / Goddard Space Flight Center, USA) from 9 to 13 june 97.
12. Domínguez, Immaculada (Universidad de Granada) from 9 to 13 june 97.
13. Shil'nov, Yurii (UKRAINE) from 1 july to 31 december 97.
14. Zerbini, Sergio (Physic Department, University of Trento, ITALY) from 1 to 10 july 97
15. Croft, Rupert (The Ohio State University - Columbus, Ohio, USA) from 21 july to 1 august 97.
16. Brevik, Iver (Physic Department, University of Trondheim, NORWAY) from 3 to 8 august 97.
17. Odintsov, Sergei D. (Physic Department, University of Cali, COLOMBIA) from 15 to 31 august 97.
18. Ford, Chris (Physic Department, University of Jena, GERMANY) from 31 august to 9 september 97.
19. Jean, Pierre (Centre d'Études Spatiales des Rayonnements, Toulouse, FRANCE) from 6 october 97 to 10 january 98
20. Norman, Dara (Washington University, USA) from 25 to 28 october 97 and from 5 to 8 november 97

21. Pollo, Anieska (Astrophysicist Copernicus Center, POLAND) from 3 to 24 november 97.
22. Lokas, Ewa ( Astrophysicist Copernicus Center, POLAND) from 4 december 97 to 4 january 98.
23. Mochkovitch, Robert (Astrophysique of Paris Institute, FRANCE) from 8 to 12 december 97.
24. Daigne, Frederic ( Astrophysique of Paris Institute, FRANCE) from 8 to 12 december 97.

The evolution of space technology and its applications is so fast that there is a strong need for having an educational tool enabling us to bring up to date the necessary knowledge and thus make use of innovations in an on-going and continuous manner. Nowadays, our academic activities have been arranged as a master's program in the applications of satellites and a series of specialized courses of short duration. Moreover, the IEEC is part of the International Space University (ISU).

These activities have been financed by Fundació Catalana per a la Recerca, by CIRIT and with students enrollments. The academic responsibility has been of teachers and UB, CSIC, UAB and UPC's scientists and also of other institutions's teachers, specially from the European Space Agency (ESA).

## **5.1. MASTER IN TELEDETECTION (1996-97)**

**Scientific Coordinator:** Dr. Xavier Pons (UAB)

### **General Formation (120h)**

- \* Introduction to operative systems, nets and programs used in course (20h).
- \* Beginnings of teledetection (70h).
- \* Beginning of Cartography, Geodesy and Space's Systems- GPS (20h).
- \* Statistics Methods I (10h).

### **Specialized formation (180h).**

- \* Statistics methods II (Multivariate Statistic and classification) (30h).
- \* Photointerpretation (25h).
- \* Meteorology. Technics and examples (15h).
- \* Oceanography. Technics and examples (15h).
- \* Geology, ground and ices. Technics and examples (25h).
- \* Topographic Cartographic. Technics and examples (15h).
- \* Geographic Information Systems (40h).

### **Individuals Practics (80h).**

### **Final project (70h).**

The total number of enrolled students has been of 21.

## **5.2. SHORT DURATION'S COURSES (1997)**

### **“Methods and instrumentals technics in High Energies's Astrophysic”.**

Dr. Juan E. Naya  
NASA/Goddard Space Flight Center (USA)

### **“Developments in engineering surveying and geodesy education”**

Dr. Martin Smith  
Geodesy's thematic net.

### **“GPS and the troposphere”**

Teacher Alan Dosdon  
Geodesy's thematic net.

## **5.3. DOCTORATE COURSES**

**“Mathematics methods’s ampliatiom”**, Doctorate plan of condensed material, department ECM “Universitat de Barcelona”, E. Elizalde, 1997-98.

**“Mathematics methods”**, Doctorate plan of Theorist Physic department ECM and department F.F. “Universitat deBarcelona”, E. Elizalde, 1997-98.

#### **5.4. ISU’S AFFILIATED CAMPUS**

The International Space University (ISU) is an academic institution of international character. It is formed by a central campus, located in Estrasbourg, and 24 affiliated campus distributed all around the world including the IEEC. Its object is post-graduate formation specialized in space world. The most important activities are its Summer School and a Master program in Space Studies.

The IEEC’s director has occupied the Vice-Presidency of Affiliated Campus Association from november 1996 to november 1997, and Presidency from november 1997 to november 1998.

#### **5.5 EXPOSITORY ACTIVITIES**

- Life’s possibility out of Earth  
Other planets? (Jordi Isern - IEEC/CSIC)  
Is there life out of Earth? (R. Guerrero - UB):  
Universitat Autònoma de Barcelona, 17/04/97
- Conference “The stars’ life”  
Cosmos, Earth and Environment week.  
Lleida, 2/10/97. J. Isern.
- “The meteorites and the origins of solar system”  
Astronomical Union of Castelldefels, 30/05/97  
Ignasi Casanova.
- “Using IDL in GPS Ionospheric Tomography”  
Second meeting of IDL’s users  
Atlas Studies  
Vitoria, 13 june 1997
- “The meteorites and the origin of solar system’s planets”  
Cosmos, Earth and Environment’s week.  
Universitat de Lleida, 1997  
Ignasi Casanova.
- Open day. Visit guiding.  
Sciences’ week.  
Commissioner to Universities and Research and Fundació Catalana per a la Recerca.  
November 1997.

### **6 SCIENTIFIC AND TECHNOLOGICAL PROGRAM**

## 6.1 FINISHED PROJECTS

1. **“Astrofísica de raigs-gamma i nucleosíntesi associada ”**,PI: Jordi Isern.1,500 MPTA. CIRIT (1997).
2. **“Técnicas de funciones zeta y sus aplicaciones, redes neuronales y estructura a gran escala del universo”** PB93-0035. PI: Emili Elizalde, 5,660 MPTA., Knowledge's General Promotion Program - DGICYT (1994-97).
3. **“Application of the zeta function regularization procedure”**. PI: Emili Elizalde, 0,630 MPTA., Acuerdos CICYT.-INFN (Italy) (1997).
4. **Beca Professor visitant** (S. Odintsov), SAB95- 0442. PI:Emili Elizalde, 4,300 MPTA. (1996-97).
5. **“Atmospheric sounding with GNSS Occultation”** SPD/CON/96-119. P.I:A. Rius, ESA 34,447 KECU (1996-97).
6. **“Explosiones termonucleares estelares: Novas y Supernovas”** HF 1996-0103. P.I: J.Isern, 0,640 MPTA. Hispan French Integrated Action (1997).
7. **“Teoría Gauge a temperatura y volumen finitos condensación y otros efectos de vacío”** HA1996-0059. PI: Emili Elizalde, 0,760 MPTA. Hispan Germany Integrated Action (1997).
8. **“Estructura a gran escala y fluctuaciones cósmicas”**HB1996-0091. PI: Emili Elizalde, 0,740 MPTA. Hispan British Integrated Action (1997).
9. **“Age of the galactic disk from White Dwarfs”** Beca Max-Planck Institut für Astrophysik, Margarida Hernanz, 0,320 MPTA.
10. **“Col·laboració projectes TMR i Capital Humà del Cesca”**  
  
With charge to the program TMR:  
Cedric Lacey (26/4/97 - 12/05/97) 0,180 MPTA.  
Francesc Granada (15//12/96 - 15/04/97) 0,850 MPTA.  
  
With charge to the program HCM:  
Maurizio Salaris (1/11/96 - 28/02/97) 0,690 MPTA.  
Pierre Jean (19/10/97 - 10/01/98) 0,620 MPTA.

## 6.2 VALID PROJECTS

1. **“Estudis de viabilitat del Satèl·lit PLANK/SURVEYOR d’ESA”**, PI: Enrique Gaztañaga, 0,900 MPTA., CIRIT (1997-98).
2. **“Gamma ray-emission during stellar eruptions and its study by means of the INTEGRAL Satellite”** (ESP95-91). PI: Jordi Isern, 9,900 MPTA. Space's National Program-CICYT (1995-98).

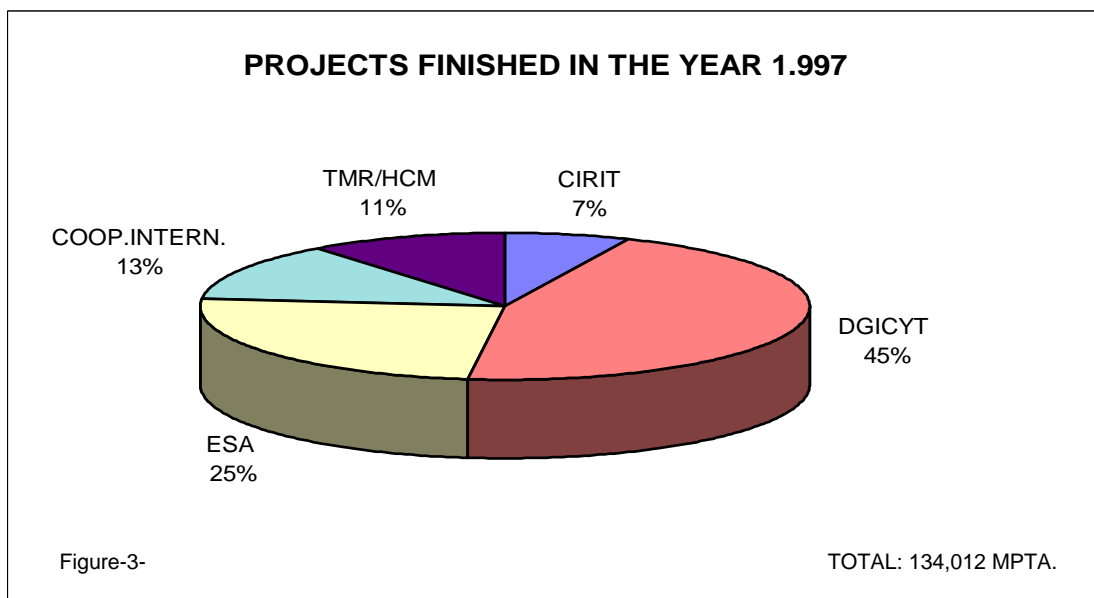
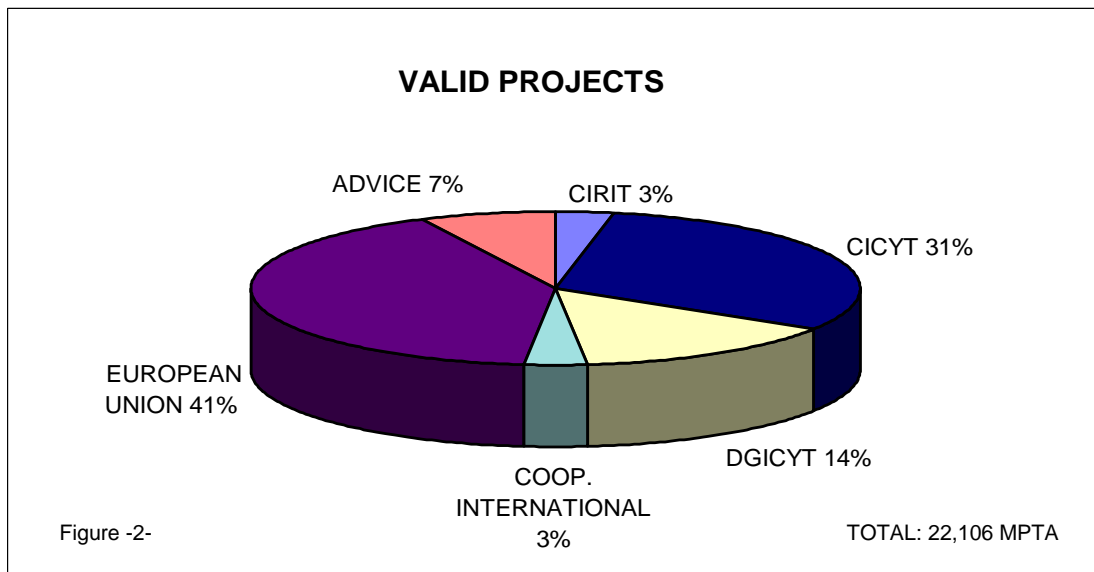
3. **“Physics and evolution of white dwarfs”** (PB94-0111). PI: Margarida Hernanz, 3,600 MPTA, General Program of Knowledge’s Promotion-DGICYT (1995-98).
4. **“The use of the Global Positioning System for the determination of the atmospheric water vapor content”** CLI95.1781. PI: A. Rius, 7,000 MPTA., Climate National Program CICYT (1995-1998).
5. **“Diseño de uno de los radiómetros del instrumento de baja frecuencia de COBRAS/SAMBA”**. ESP96-2798-E. PI: Enrique Martínez (U. Cantabria), 6,406 MPTA. Responsible IEEC E. Gaztañaga (1,300 MPTA). Space National Program-CICYT (1997-98).
6. **“Cosmología básica y observacional”** PB96-925. PI: Emili Elizalde, 9,900 MPTA. Knowledge General Promotion- DDGICYT (1997-2000).
7. **“Cosmología básica y observacional”** PB96-925. PI: Emili Elizalde, 6,000 MPTA (scholarship FPI), Knowledge General Promotion-DGICYT (1997-2000).
8. **Scholarship Visitor teacher** (Y. Shil’nov), SB96-A04620572. PI: Emili Elizalde, 2,640 MPTA (1997).
9. **“Measurements of Vertical Crustal Motion in Europe by VLBI (radio-interferometry)** FMRX-CT96-0071 CO-P1. PI: Antoni Rius, 224 KECU. EC Framework IV Environment and Climate Workprogramme (1994-98).
10. **“GPS/Water Vapour Experiment for Regional Operational Network Trials”** ENV94-CT96-0301. Co-PI: Antoni Rius, 180 KECU. EC Framework IV Environment and climate Workprograme (1994-98).
11. **“Climate and environmental Monitoring with GPS Atmospheric Profiling”** ENV4-CT97-03847 PI: Antoni Rius, 120,950 KECUS Environment and climate Workprograme (1997-00).
12. **“Estructura a gran escala de las fluctuaciones cósmicas”**. PI: E. Elizalde, 0,810 MPTA. Agreement CSIC-Sciences Academy of Poland (1997-98).
13. **“SIXE: Spanish- Italian x-ray experiment”** ESP97-1784-E. PI: Jordi Isern, 4,500 MPTA. Space’s National Plan Special Action(1997-98).
14. **“Determinación de órbitas y parámetros atmosféricos con GNSS/MINISAT DOPA”** ESP97-1788-E.PI. Antoni Rius, 6,600 MPTA.CICYT (1997-1998).
15. **“Collaborative Research Grant”** CGR970144. Bilateral agreement Hispano-USA (OTAN). PI: J. Frieman (NASA/Fermilab), 0,700 MPTA.CICYT (1997-1999).
16. **“Altimetría espacial: calibración,validación de la órbita y procesado de datos altimétricos del Topex/Poseidón, ERS-2 y GEO-1 en el Mediterraneo occidental”** ESP97-1816-CO4-03.PI:J.J. Martínez-Benjamín, 12,420 MPTA. Space’s National plan-CICYT (1997-00).

17. **Grup de ciències del Cosmos** Groups of consolidated research- CIRIT. PI: J.Isern, 3,100 MPTA. (1997-99).

18. **Contracte INDRA** IE/B/97/01. PI: A. Rius, 9,000 MPTA. (1997-98).

19. **Assessorament sobre la recepció de dades MESTEOSAT.** Catalonia's Meteorology Service, 0,700 MPTA.(1997-98).

20. **DE HIPPARCOS a GAIA: parámetros fundamentales desde el espacio.**ESP97- 1803 PI: J. Torra, 10, 741 MPTA Space's National Plan Special Action (1997-00).



### 6.3 MANAGED PROJECTS TO INVESTIGATORS OF RECENT INCORPORATION.

- **“Nucleosíntesis y últimos estados de la evolución de las estrellas”** PB94-0827-C02-02. General Promotion of Knowledge-DGYICIT. PI: Enrique García-Berro Montilla (UPC), 10,500 MPTA. (1995-98).
- **“Nucleosíntesis y últimos estadios de la evolución de las estrellas”** PB94-0827-C02-01 General Promotion of Knowledge-DGICYT. PI: Ramón Canal Masgoret (UB), 11,480 MPTA. (1995-98).
- **“Explotación de los datos del Satélite Hipparcos”** ESP95-0180. Space National Plan of CICYT. PI: J.Torra(UB), 7,300 MPTAA. (1995-98).

These projects have not been included in the figures 2 and 3.



ID	Task Name	1996				1997				1998				1999				Qtr 1	
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4		
1	<b>Recerca Bàsica i Aplicada</b>																		
2	Atmos. Sound. (ESA)	■																	
3	GPS & vapor water (CICYT)	■																	
4	Crustal motion & VLBI (EU)	■																	
5	GPS/Water vapour Regional I	■																	
6	Altimetria T/P (CICYT)									■									
7	<b>Desenvolupament</b>																		
8	Estudi fase A DOPA									■									
9	<b>Transferència coneixement</b>																		
10	Curs GPS	■																	
11	Contracte INDRA					■													
12	Recepció dades METEOSAT					■													
13																			
14																			
15																			
16																			

GNSS Applications

ID	Task Name	1996				1997				1998				1999				Qtr 1	
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4		
1	<b>Recerca Bàsica i Aplicada</b>																		
2	Emissió gamma & INTEGRAL																		
3	Explosions termonuclears: N																		
4	Astronomia gamma																		
5	TMR/MPA																		
6	TMR/CESR																		
7	<b>Desenvolupament</b>																		
8	Estudi Fase A SIXE																		
9	<b>Transferència coneixement</b>																		
10	Instruments gamma																		
11																			
12																			
13																			
14																			
15																			
16																			

Astrophysics High Energies

ID	Task Name	1996				1997				1998				1999				Qtr 1
		Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	
1	<b>Recerca Bàsica i Aplicada</b>																	
2	White Dwarfs (DGICYT)	[Blue bar spanning Qtr 1-3 1996]																
3	Hipparcos (CICYT/PNIE)	[Blue bar spanning Qtr 1-3 1996]																
4	Hipparcos a GAIA (CICYT/PNIE)	[Blue bar spanning Qtr 3 1997 to Qtr 1 1999]																
5	<b>Desenvolupament</b>																	
6	OMC	[Blue bar spanning Qtr 2 1997]																
7	<b>Transferència coneixement</b>																	
8																		
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11																		
12																		
13																		
14																		
15																		
16																		

Stellar and Galactic Astronomy



## 6.4 DOCTORATES THESES IN REALIZATION PHASE

- **“Cosmological perturbation theory and the spherical collapse model”** Pau Fosalba, Dir. Thesi: Emili Elizalde and Enrique Gaztañaga.
- **“Assimilació de dades GNNS (Global Navigation Satellite System) en models de predicció numèrica”** Lidia Cucurull, Dir Thesi: Antoni Rius.
- **“Paràmetres atmosfèrics mesurats utilitzant LEO i les constel·lacions GNSS”** Alex Flores, Dir. Thesi: Antoni Rius.
- **“Fluctuacions de temperatures en la radiació de fons”** José Barriga, Dir.Thesi: Emili Elizalde and Enrique Gaztañaga.
- **“Gamma-ray emission of novae and tyre in supernovae”** Jordi Gómez, Dir. Thesi: Jordi Isern and Margarida Hernanz.
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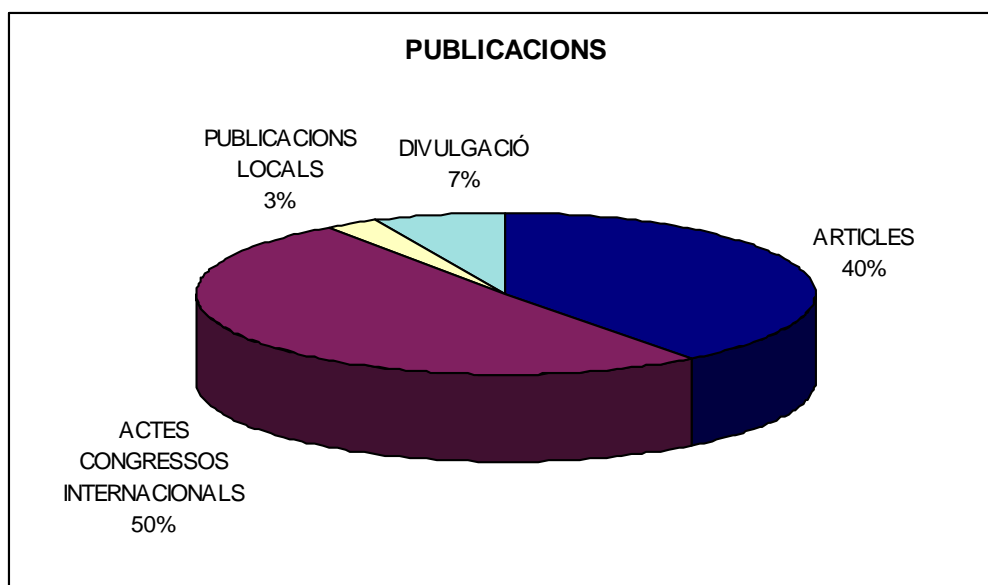
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2. **La missió INTEGRAL: un observatori de raigs-gamma**, Jordi Gómez-Gomar (22/01/97).
3. **Simulació de la col·lisió de nanes blanques amb SPH. Com construir animacions**, Josep Guerrero (30/01/97).
4. **L'universe violent: explosions de noves**, Jordi José (6/02/97).
5. **Resultados recientes de VLBI en Ciencias de la Tierra**, Antonio Rius, (20/02/97).
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5. **Progress in the large scale structure of the Universe**, Joshua Frieman (Fermilab & University of Chicago), (12/02/97).
6. **Estrellas y cúmulos estelares**, Maurizio Salaris (13/02/97).
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9. **Tècniques de control i seguiment de les superfícies cultivades de la CE a través de teledetecció**, Javier Gallego, (06/03/97).
10. **El sensor aerotransportat ATM**, Eduardo de Miguel (INTA), (07/03/97).
11. **Aplicacions de Teledetecció en l'Oceanografia**, José Sobrino (Universitat de València), (12/03/97).

12. **Developments in engineering surveying and geodesy education**, Alan Dodson (Geodesy Thematic Net), (13/03/98).
13. **Els projectes que es porten a terme a la Universitat d' Alcalà de Henares**, Emilio Chuvieco (Univ. Alcalá de Henares), (14/03/97).
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19. **Nuclear uncertainties on the production of  $^{22}\text{Na}$  and  $^{26}\text{Al}$  in novae. Nucleosynthesis in X-ray Bursts**, Michael Wiescher (University of Notre Dame, Indiana -USA-), (14/05/97).
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4. **Multiplicative anomalies**, Emili Elizalde, University of Leipzig (GERMANY), (02/06/97).
5. **Línies futures de recerca i infraestructura que ofereix l'IEEC d'interès per a la Universitat**,Jordi Isern, Universitat Autònoma de Barcelona, (06/06/97).

6. **Casimir effect to spheres and circles by zeta regularization**, A. Romeo, CSIC-Madrid, june 1997.
7. **El Sistema Solar como frontera científica** Report Round Table “La financiación de la exploración espacial”, I. Casanova, Escorial summer courses. Fundación Universidad Complutense, 18 august 97.
8. **El Sistema Solar como frontera científica** Invited Conference “Los meteoritos y la materia prima del Sistema Solar”, I. Casanova, courses of Escorial Summer. Fundación University Complutense, 19 august 97.
9. **Determinant anomalies** Emili Elizalde, Technical University of Vienna (AUSTRIA), (25/08/97).
10. **Quantum vacuum fluctuations in spherically symmetric configurations**, Emili Elizalde, UNAM (MEXICO), (19/09/97).
11. **High-Resolution Transmission electron Microscopy in Catalysis and Related Techniques**, J. Llorca, University Degli Studi di Udine (ITALY), (13/10/97).
12. **New formules for spectral zeta functions and applications**, Emili Elizalde, University of Trento (ITALY), (06/11/97).
13. **Nucleosynthesis in classical novae: implications for gamma-ray astronomy**, Margarida Hernanz, Max Planck Institut Für Astrophysik (GERMANY), (26/11/97).
14. **New formules for zeta functions and determinant anomalies**, E. Elizalde, University of Barcelone, (15/12/97)
15. **Global Positoning System & Precipitable water -ISU 97**, Houston (USA). L. Cucurull.
16. **Classical novae: a laboratory for nuclear astrophysics**. J. José, CSNSM-IN3P3, Orsay (FRANCE), (18-12-97).
17. **4-D Distribution of the Ionospheric Electron Density using GPS/MET and Groundbased Receivers, EGS97**, Antonio Rius, Viena (AUSTRIA), (april 1997).
18. **An experiment for estimation of the spatial and temporal variations of water vapor using GPS and WVR data, EGS97**, Pedro Elósegui, Viena, (AUSTRIA), (april 1997).
19. **4-D Distribution of the ionospheric elstron density using GPS/MET and ground-based receirvers**, Giulio Ruffini, Melbourne (AUSTRALIA), (july 1997)
20. **An experiment for estimation of the espatial and tmeporal variations of water vapor using GPS and WVR data**, Pedro Elósegui, Melbourne (AUSTRALIA), (july 1997).
21. **4-D Distribution of the ionospheric electron density using GPS/MET and Ground-based receivers**, Giulio Ruffini, Jet Propulsion Laboratory, Pasadena (CALIFORNIA), (desember 1997)
22. **.XT-GIST: a software tool for ionospheric tomography**, Alex Flores, University Corparation for Atmospheric Research, Boulder (COLORADO), (december 1997).

## 6.10 VISITES TO OTHER INSTITUTIONS

1. **Institut d'Astrophysique de Paris and Centre de Spectrométrie Nucléaire de Sepctrométrie su Masse** (Orsay - France), M. Hernanz, from 13 to 15 of january 1997.
2. **Institut für Physik** (University of Jena, RFA), E.Elizalde, may 97.
3. **Institut für Physik** (University of Leipzog,RFA), E. Elizalde, june 97.
4. **Department of Physics and Astronomy**, (University of Oklahoma), A. Romeo, july 97.
5. **Institut d'Astrophysique de Paris**, J.Isern, from 4 to 9 november 1997.
6. **Max Panck Institut für Astrophysik** (Munich, Germany), M. Hernanz, from 17 to 12 december 1997.
7. **NASA/Fermilab Center for Astrophysics** (Chicago, USA), "Fluctuaciones cósmicas en el Universo", E. Gaztañaga, 3 months (1996-97).
8. **Utilització del telescopi Isaac Newton (INT) 2.5 m.** E. Gaztañaga, november 1997.
9. **University of Granada** Department of Physic Theorist and Astronomy, J.Isern, from 18 to 19 december 1997.
10. **Centre de spectrométrie nucléaire et de spectrométrie de masse CNRS** (Orsay, FRANCE), J.José. from 18 to 25 january 1997.
11. **Institut d'Astronomie et d'Astrophysique**, Université libre de Bruxelles (Brussels, BELGIUM), J. José, from 6 to 13 setember 1997.
12. **University Corporations for Atmospheric Research** (Boulder,COLORADO), Alex Flores and Giulio Ruffini, from 18 november to 1 december 1997.
13. **Jet Propulsion Laboratory** (Pasadena, CALIFORNIA), Alex Flores and Giulio Ruffini from 1 to 5 december 1997.
14. **ESTEC** cooperation with EGOPS software development, Alex Flores, from 10 to 17 december 1997.

#### **6.11 ATTENDANCE AT SPECIALIZED SCHOOLS**

1. **Facoltà di Scienze, Università d'Annunzio** Pescara (Italy), "Short Course in Planetary Geology", V. Gràcia, from 11 to 17 may 1997.
2. **"V Escuela de Otoño de Física Teórica"** Santiago de Compostela, Form master "Cosmology and Physic of Particules", P. Fosalba, 8-18 september 97.
- 3 . **"V Escuela de Otoño de Física Teórica"** Santiago de Compostela, Teacher master "Estructura a gran escala en el Universo", E. Gaztañaga, september 97.

#### **6.12 PARTICIPATION IN CONGRESS**

1. **Multifrequency behaviour of high energy cosmic sources**, Vulcano (Italy), J. Isern, may 97.
2. **Las estrellas enanas blancas como objetos fronterizos**, Biennial meeting of Royal Spanish Society of Physics, J. Isern, 30 september 97. Conference invited.
3. **Evidence for a break in the power spectrum**, Congress "Fundamental physics at the birth of the Universe, II" Osservatorio Astronomico - Viale Parco Mellini 84 - I-00136 Rome, E. Gaztañaga, 1997. Conference invited.
4. **Non-Gaussian traces in the variance from small scale CMB observations**. Congress "Precision Mesures in the Large Sacle Structure if the Universe". Aspen Center for Physics, CO 81611, USA. 1997. E. Gaztañaga. Conference invited.
5. **The noncommutative anomaly**, "Wigner Symposium V", Vienne (Austria), 1997, E. Elizalde, conference invited.
6. **Feasibility and applicatrions of sulfur concrete for lunar base development: a preliminary study**. *Lunar and Planetary Science XXVIII*: 343-344, 1997, I. Casanova.
7. **Oxidación de sulfuros y cinética de reacciones expnasivas inducidas en materiales con base de cemento**. *I Geochemist's Iberic Congress and VII Geochemist's Congress of Spain*, pp.553-559, 1997, I. Casanova, L. Agulló and A. Aguado.
8. **Aproximación cosmoquímica al cálculo de la composición de la Tierra**. *I Geochemist's Iberic Congress and VII Geochemist's Congress of Spain*, pp 620-623, 1997, I. Casanova.
9. **Claves isotópicas sobre el origen y distribución de los volátiles en la corteza lunar**. *I Geochemist's Iberic Congress and VII Geochemist's Congress of Spain*, pp. 649-656, V. Gràcia and I. Casanova..
10. **Cosmoquímica dela formación de planetas de tipo terrestre**. *I Geochemist's Iberic Congress and VII Geochemist's Congress of Spain*, pp 624-631, 1997, J. Valeriano and I. Casanova.
11. **La Geoquímica como asignatura troncal en las ciencias físicas y experimentales**. *I Geochemist's Iberic Congress and VII Geochemist's Congress of Spain*, pp. 579-582, 1997, I. Casanova.
12. **Science and technology opportunities of georadar studies of the Moon from (mini, micro) rovers**. *EuroMoon Science and Payload definition workshop*. ESTEC (ESA), Noordwijk, (Holland), I. Casanova and the Planetary Science & Engineering Group. 28 october to 2 november 1997.
13. **Cóndrulos de piroxeno en el meteorito de Sevilla: Composición química y metamorfismo asteroidal**. *I Geochemist's Iberic Congress and Geochemist's Congress of Spain*, pp612-619, 1997, J. Llorca.
14. **Nucleosynthesis in Classical Novae: Recent Results from TNR Theory**. *13th North American Workshop on Cataclysmic Variables*. 19 june 1997. Margarida Hernanz.
15. **Nuclear uncertainties and their role in new nucleosynthesis**. *III Tours symp. on nuclear physics*, Tours (France) from 2 to 5 september 1997, J. José. Conference invited.



16 . **Prediction of gamma-ray emission from classical novae and their detectability by CGRO.***4th Compton Symposium*, april 1997, Margarida Hernanz.

### 6.13 OTHER ACTIVITIES

- J. Isern, member of Scientific Commission of Gran Telescopio de Canarias, 1997-98.
- J. Isern, Co-Editor of the magazine "Europhysic Letters" 1992/97 (vacancy april 1997 when he finished his term of office).
- J. Isern, Vocal of Assigantion of Time Commission of Canary Islands Observatory, 1995-97.
- J. Isern, Vice-president of Affiliated Campus Association of ISU, 1996/97. (Vacancy november when he finished his term of office).
- J. Isern, President of Affiliated Campus Association of ISU. (Join in november 1997).
- A. Rius, IAG Special Study Group 1.159. Use of GPS Positioning for Atmospheric Monitoring.
- A. Rius, Special Study Group. 1.158 Use of GPS antena and site effects.
- E. Elizalde, Wigner Symposium V, Austria, Chairman.

### 6.14 HELP ON THE RESEARCH

Across the IEEC, the Fundació Catalana per a la Recerca has contributed to the organization of the following activities:

- **GATAGRASS** GATAGRASS is a user interface grapher for the program GRASS. This interface is meant to ease the use of this geographic information program in a graphic environment. This program has been elaborated by the GATA of the Universitat Autònoma de Barcelona and the FCR distribute this by way of Internet across the IEEC.
- Exposition "The countdown: Europa in the space". Science Museum of Fundation "La Caixa". July 97.
- "Advanced seminary in physic oceanographic. Oceanography Antartic Pole". Chemical Engineering Laboratory UPC and IEEC, 22-23 setember 97.
- Direct retransmission of the launching ARIANE 502. Science Museum of the Fundation "La Caixa", European Space Agency. 30 october 97.
  
- Conference in colaboration with AESS

Showing of APOLO 13. Organized by AESS Students and European Space Agency. 7 may 97.

Conference “ARIANE, European System of Transport in the Space” by Dr. Joan de Dalmau, ESA. Organized by AESS Students and European Space Agency, 9 may 97.

Conference “El Programa Espacial Europe, Resultados y Perspectivas” by Dr. Antoni Accensi, ESTEC/ESA. Organized by AESS Students and European Space Agency, 14 may 97.

Conference “Applications of Radar Polarimetry in Remot Sensing” by Dr. Shane Cloude. Organized by AESS Students, Department of Theory of Signal and Communication and Barcelona Students Group of IEEE, 29 may 97.

Conference “Tour del sistema solar”. Organised by AESS Students, 12 November 97.

Round table with Pedro Duque, ESA astronaut. Organised by AESS Students and European Space Agency, 12 December 97.

• **IEEC Info** It is an electronic mail distribution list which inform about the convoke of awards on the national and international level, helps, congress and work offers in relation with spatial sector. The subscribers to this list are Research Centres and research students. During 1997 we have send 300 messages