ISAAC *MARTÍN-BARBERO*
Director General ICEX Spain Trade and Investments

It is a great pleasure for ICEX Spain Trade and Investments to be part of this year's edition of SPIE leading a delegation of outstanding Spanish companies active in the Astrophysics sector. There can be no question that science will be at the heart of global modern economies and its applications shall be keys of any sustainable competitive advantage. The presence of Spanish companies at this event highlights not only their own individual significance but also sheds light on their ability to enhance the potential of many other areas of our industry.

MIGUEL ÁNGEL *CARRERA*
President of INEUSTAR,
the Spanish Science Industry Association

The Spanish Science Industry, represented by INEUSTAR, takes pride in showing some of its capabilities at SPIE 2014. Our member companies, working closely with scientists and astronomy organizations, are helping to design and build unique observatories, custom made infrastructures and highly complex instrumentation all over the world.

XAVIER *BARCONS*
CSIC Research Professor
& ESO Council President

The fact that Astronomy generates high-throughput scientific research more than any other field in Spain is a tribute to talented scientists, engineers and technicians. But it is also an affirmation of the number of industries that took the challenge to develop key high-tech elements of the large ground-based telescopes and space science missions that scientists need to advance. This synergy is paying off on all fronts, including the economy, by generating activity in areas that produce high added value. Overall a great success that must continue.

RAFAEL *REBOLO*
Director of the Instituto
de Astrofísica de Canarias (IAC)

The close collaboration between the Instituto de Astrofisica de Canarias and Spanish advanced technology companies was key to the construction of the Gran Telescopio Canarias, one of the largest diameter optical and infrared telescopes in the world, which is contributing significantly to positioning Spanish astronomy at the forefront in exploring the Universe.

The Instituto de Astrofísica de Canarias (IAC) is an internationalized Spanish research centre. The IAC has been designated a 'Severo Ochoa Center of Excellence' by the Spanish government. It has two headquarters and two observatories -the Observatorio del Teide (Tenerife) and Observatorio del Roque de los Muchachos (La Palma)-, set in an environment of excellent astronomical quality, both constituting the European Northern Observatory (ENO) .

The Instituto de Astrofísica is the main headquarters and normal workplace of the greater part of its staff. Here, astrophysical research and technical projects are developed. There is also a postgraduate school. The IAC also considers scientific outreach as one of its principal aims. The IAC's other headquarters is the Centre for Astrophysics, which is located on La Palma and also houses the offices of the Gran Telescopio CANARIAS and the Magic Collaboration, as well as the supercomputer LaPalma.

INEUSTAR, the Spanish Science Industry Association is a private, nonprofit organization founded and owned by Spanish industrial companies that devote a relevant part of their business to supplying special installations, equipment and instruments to Large-Scale Research Facilities (LSRFs or GICs) . That way we help to make a better understanding of our universe possible, both on a subatomic scale and in the context of galactic dimensions. Particle Physics, Fusion, Astronomy and Space sciences, Biology and new Energy sources are but a few of the fields in which our companies are active and highly competitive. INEUSTAR promotes the growth of the Spanish Science Industry by providing special services, fostering new collaborations, disseminating capabilities and references, promoting R&D and working closely with local and international LSRFs.

The Spanish astronomical community contributes to SPIE 2014 conferences with a relevant participation in more than 150 papers. Some of the Spanish organizations presenting communications are:

- Private Companies:

AVS, S.L.U.; EADS Astrium Crisa, S.A.U.; Elecnor Deimos; FRACTAL S.L.N.E; GMV S.A; GRANTECAN, S.A.; GTD, S.A.; IDOM, S.L.; NTE-SENER, S.A.; SENER, S.A.; Trinos Vacuum-Projects, S.L.;...

- Universities:

UAB; UAH; UAM; UB; UC; UCAV; UCM; UGR; ULL; UNIOVI; UPC; UPCT; UPM; URV;...

- Institutes and Other Research Centers:

CAB; CEFCA; CIEMAT; CSIC; ESAC; IAA; IAC; ICE; ICFO; ICMA; ICMAB; IEEC; IFAE; IMM; ING; INTA; IRAM; TNG.

ICEX
Paseo de la Castellana 14-16
28046 Madrid Spain

INEUSTAR
Pol. Ind. SIGMA, C/Xixilion 2, 1ª pª, Of. 5ª
20870 ELGOIBAR (Gipuzkoa) Spain

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND
A WAY TO MAKE EUROPE

Main picture: GTC (Gran Telescopio Canarias) at twilight. Author: Pablo Bonet/IAC.
This telescope is located in one of the top astronomical sites in the Northern Hemisphere: the Roque de los Muchachos Observatory (Canary Islands, Spain).

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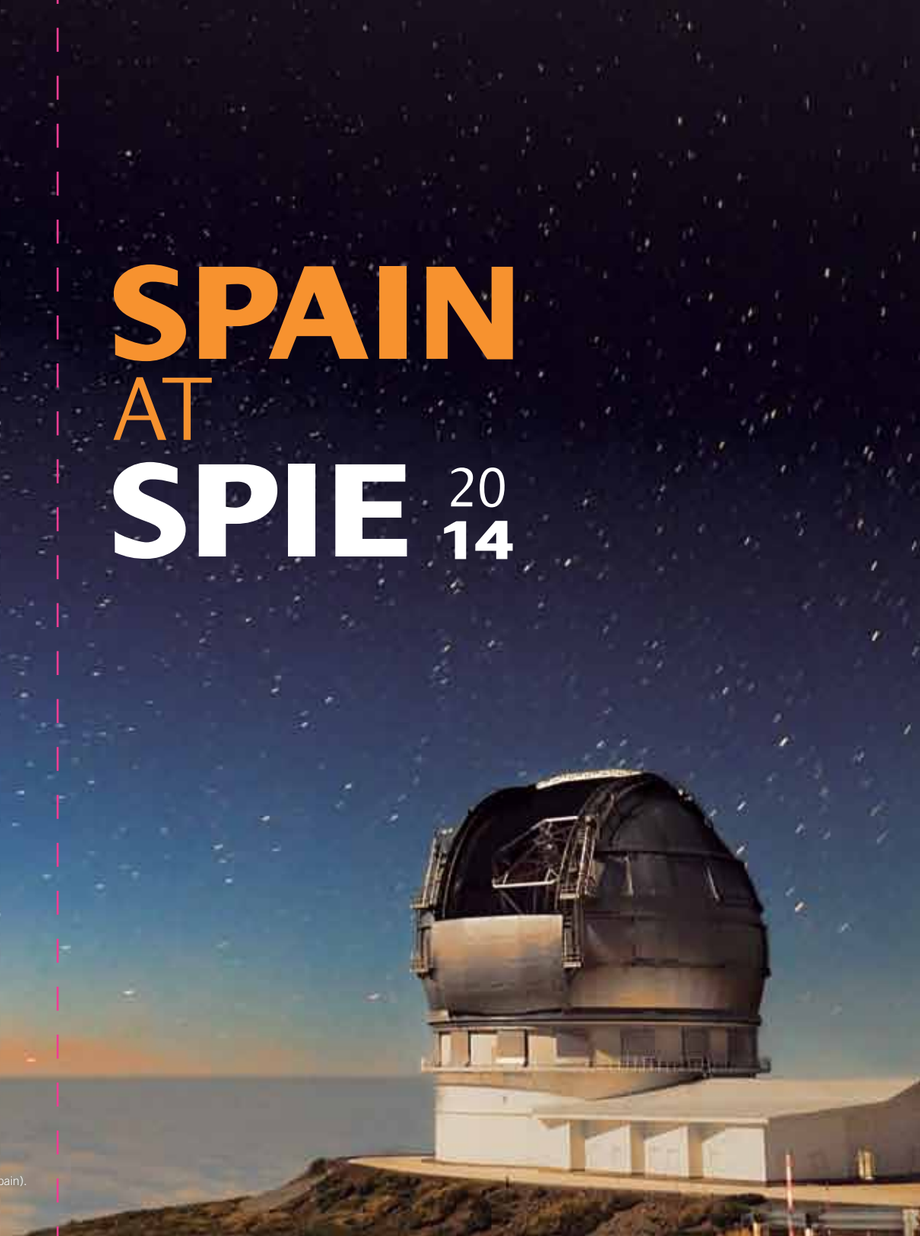
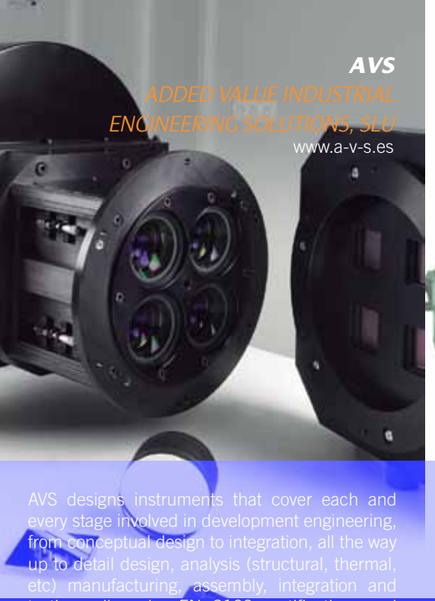
SPAIN AT SPIE 2014





AVS

ADDED VALUE INDUSTRIAL ENGINEERING SOLUTIONS, SLU

www.a-v-s.es

AVS designs instruments that cover each and every stage involved in development engineering, from conceptual design to integration, all the way up to detail design, analysis (structural, thermal, etc) manufacturing, assembly, integration and testing, all under EN 9100 certification, and with the advantage of on-site manufacturing, assembly and integration facilities, and a clean room.

AVS provides expertise in high precision instruments to work in hazardous environments such as radiation, cryogenic temperatures, vacuum and high magnetic fields:

- High precision instruments.
- Micro-mechanisms.
- Cryogenics.
- Radiation hard mechanism.
- Opto-mechanics.

AVS has developed instrumentation for telescopes and astrophysics such as: Multi Object Spectrographs (MEGARA), Focal planes (BigBOSS), Fiber optic positioners (SIDE, MEGARA, BigBOSS), Opto-mechanics (XMS, ESPRESSO, EDIPO-BOOTES) and mecatronics for infrared-cryogenics (MIRADAS).

AVS is involved in recognized astrophysics consortiums: DESI-BigBOSS (LBNL), MIRADAS (UF), MEGARA(UCM).

CESA

COMPAÑÍA ESPAÑOLA DE SISTEMAS AERONÁUTICOS, S.A.

www.cesa.aero

CESA is an Aeronautical Company with 25 years experience as an independent business unit owned by AIRBUS Defense & Space (60%) and United Technologies (40%). The company is located in Spain specifically in Madrid (main center) and Seville.

Development, production and support of fluid-mechanical components (Hydraulic, Pneumatic and Fuel) for Flight Control, Landing Gears, ECS and Hydraulic Systems for the aeronautical industry. With high precision positioning and suspension systems for scientific instruments. Mechanical design with high expertise in hydraulic and electrical actuation.

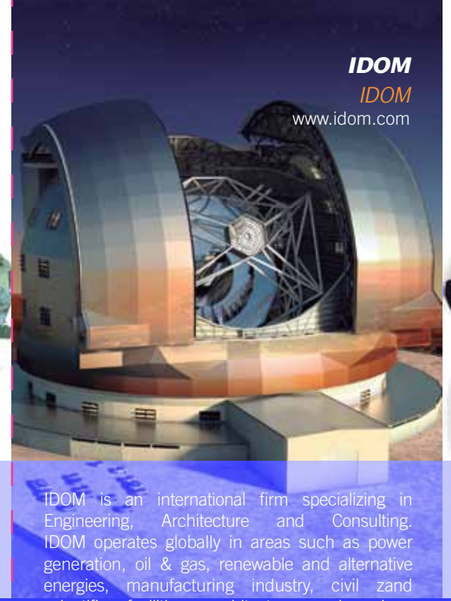
E-ELT (ESO):

- Conceptual design of the primary mirror cell.
- Design and manufacturing of 3 segment sub-unit prototype for the primary mirror M1, (10,5m) consisting of: Axial Support, Lateral Support, Clocking Restraint, Moving Frame and Fixed Frame.
- Design and manufacture of 3 electromechanical prototypes of "Soft Actuator" based on Voice Coil Device for the primary mirror M1.

Gran Telescopio de Canarias (GTC):

- Design and manufacture of 36 Support Systems for the primary mirror M1, consisting of: Axial Support, Lateral Support and Clocking Restraint.
- Design and manufacture of 108 units + spares of Hard Actuator based on hydraulic electrical two stage positioning system.

These components are actually in operation.



IDOM

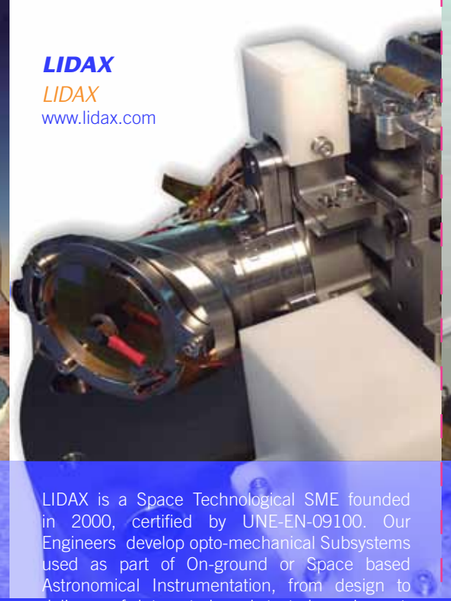
IDOM

www.idom.com

IDOM is an international firm specializing in Engineering, Architecture and Consulting. IDOM operates globally in areas such as power generation, oil & gas, renewable and alternative energies, manufacturing industry, civil zand scientific facilities, architecture and unique challenging engineering projects.

IDOM is a multidisciplinary engineering firm which provides advanced engineering and turnkey solutions for challenging projects involving applied mechanics, structural design, electronics & control. IDOM experience in Astronomy Projects involves telescope, telescope systems and instrumentation.

- DKIST (formerly known as ATST) Enclosure Design and Fabrication.
- E-ELT Dome Preliminary and Detailed Design.
- EST Transfer Optics and Building Design.
- TMT Main Structure Review and Cost Estimate.
- GTC Folded Cassegrain Sets (Instrument Rotator and A&G Optomechanics).
- QUIJOTE CMB First and Second Telescope.
- FastCam Instrument Optomechanics.
- PlanetCam Instrument.
- Wide FastCam Instrument.



LIDAX

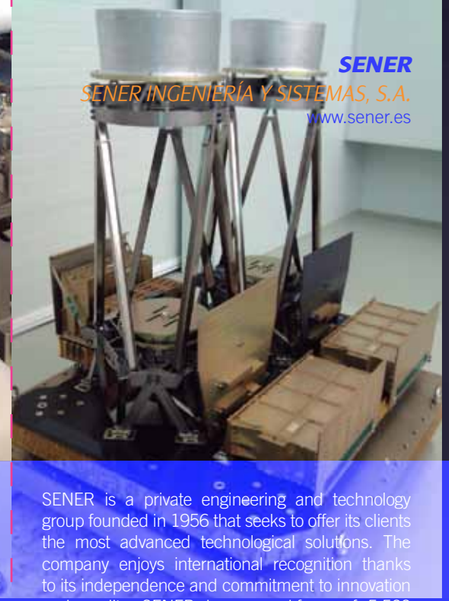
LIDAX

www.lidax.com

LIDAX is a Space Technological SME founded in 2000, certified by UNE-EN-09100. Our Engineers develop opto-mechanical Subsystems used as part of On-ground or Space based Astronomical Instrumentation, from design to delivery of integrated and tested equipment. LIDAX specializes in cryogenic opto-mechanics and high accuracy cryogenic mechanisms.

Advance Mechanical Equipment for Instrumentation, Opto-Mechanical Design and Engineering, Thermo-Mechanical Engineering, Focal Plane Assemblies, Spectrometers, Telescope Optics Mounts, High Accuracy Cryogenic Mechanisms (Submicron Linear Actuators and Translation Stages).

- James Webb Space Telescope. MIRI Telescope Simulator (MTS). Cryogenic Mirrors with remote rotation capability- 2DoF. Pick-off Mirror Simulator mid-IR Operation T: 35K-77K.
- IACAT Atmospheric Turbulence Simulator Telescopes for Adaptative Optics. Simulating different GTC, WHT and OGS IAC Telescopes.
- FPA for MIX-T & MIX–C Instruments of ESA Bepi Colombo Satellite. Models DM,STM,EM,QM&2FM.
- FPA Co-Alignment Sensor CAS-ATLID Instrument Earthcare EO Satellite. Models STM, EQM&PFM.
- Telescope Optics for IRS & FCI Instruments of the Meteorological Third Generation Satellites. Optical Telescope Mounts.
- Lateral Support for M1 Mirrors Interface with Ceramic Mirror Subsystem with low Axial Stiffness and High Lateral Stiffness GTC.



SENER

SENER INGENIERÍA Y SISTEMAS, S.A.

www.sener.es

SENER is a private engineering and technology group founded in 1956 that seeks to offer its clients the most advanced technological solutions. The company enjoys international recognition thanks to its independence and commitment to innovation and quality. SENER has a workforce of 5,500 professionals working at its offices in more than 15 countries and a turnover over 1,200 billion Euros.

In Space, SENER has developed from its inception, instruments and mechanical systems that cover almost all the needs of the Flight Segment. Moreover, SENER supplies essential items for completing successful missions, such as Attitude or Control Systems (AOCS) and Guidance, Navigation and Control systems (GNC).

SENER develops Optical Systems: twin reflective telescopes for SEOSAT/INGENIO and Imaging and Slitless Spectroscopy Instrument for Surveys (ISSIS) for the WSO-UV; Mechanisms: Secondary Mirror refocusing mechanisms for GAIA M2MM and EUCLID M2MM; Systems: Communication antennas, feed through Mechanisms Subsystem, Instruments boom and scientific instruments for SOLAR ORBITER; and Instruments Systems: Camera actuating System for JPCAM; Concept design for Calibration and Secondary Guiding subsystems for E-ELT HARMONI; Wavelength Selection Subsystem filter wheels for GTC OSIRIS; Electronics for Detector translation and Slit mask subsystems for GTC EMIR; The co-rotator main assembly for VLT GRAAL, and the amplitude calibration device robotic arms for ALMA.

TTI

TTI NORTE, S.L.

www.ttinorte.es

TTI works in the technological forefront of radio astronomy, space, telecommunications and science industries. TTI develops Radiofrequency equipment (e.g. LNAs) to operate at cryogenic temperatures (i.e. <15K), and custom design Geodetic full receivers.

Radiofrequency @ cryogenic temperatures: Low Noise Amplifiers (Cryo LNAs), Cryostats, Antenna Feeders, etc. and low noise, highly integrated full Receivers for cryogenic and uncooled applications (e.g. VLBI - Very Long Baseline Interferometry receivers).

TTI has supplied hundreds of cryogenic LNAs from a wide range portfolio of solutions in S, C, X and Ka band, extremely stable and highly reliable, designed to operate at extremely low temperatures, and based on GaAs, InP HEMT and hybrid technologies for radio-telescopes all over the world, such as ALMA (Chile), Plateau de Bure interferometer (France), Smithsonian Observatory (US), NOEMA telescope (France) and Pico Veleta Radio-telescope (Spain).

TTI has also provided Turn key VLBI Receivers (design, manufacturing, onsite installation and training), including antenna feed, polarizer, cryogenically cooled RF unit (cryostats and LNAs), room temperature RF & IF units, control system, to institutes worldwide like Metsähovi Radio Observatory in Finland or VIRAC (Ventspils International Radio Astronomy Center) in Latvia.