

The aim of the Joint Astrophysics Division

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Chairman of JAD

There is at present a thriving interface between physics and astronomy and the purpose of JAD is to respond to the need of the fast expanding community of scientists working in that domain by organising workshops and conferences and providing forums for discussion whenever needed. JAD should eventually become a grassroots partner for research organisations that try to co-ordinate their programmes as, for example the newly created AstroParticle Physics European Co-ordination (APPEC). In 2000, JAD organised the first ESA-CERN workshop on "Fundamental Physics in Space", which was held at CERN [1]. The past and present chairmen invested much effort in helping to establish permanent links between ESA and CERN, and the two organisations have actually found several areas of fruitful collaboration.¹

The Joint Astrophysics Division has two sections:

- one on "Solar Physics", which has long existed and which organises a well-attended European conference in that domain every three years (Chairman: Jan Kuijpers, Nijmegen);
- the other on "Gravitational Physics" (Chairman: Gerhard Schaefer, Jena), which has been established earlier this year and which brings together gravitation theory and experimentation with, in particular, the search and — hopefully soon — the study of gravitational waves.

The activities of this second section began in 2001. JAD will continue to develop its structure. A new section on "Astroparticle



Members of the Board of the Joint EAS-EPS Astrophysics Division (JAD) met at CERN the day before the ESA-CERN Workshop on "Fundamental Physics in Space and Related Topics". From left to right: Martin C.E. Huber, Michel Spiro, Clare Bingham (ESA), Daniel Enard, Eckart Lorenz, Jean-Pierre Swings, Gerhard Schäfer (Chair, Gravitational Physics Section), Bernard Schutz, Gustav A. Tammann and Jan Kuijpers (Chair, Solar Physics Section) [Photo: Maurice Jacob].

Physics" is at the building stage, to start operating by 2002. This special issue of Europhysics News covers many of the domains where JAD hopes to foster efforts throughout Europe.

Among the main topics at present are: the physics of stellar interiors, plasma astrophysics, neutrinos from space, searches for dark matter and antimatter, high-energy astroparticle physics, very-high-energy cosmic rays, the search for gravitational waves and all the fascinating questions related to cosmology. This latter domain is rich in experimental possibilities, with the improved measurement of key global properties of the Universe such as the Hubble constant, the cosmological constant, the hadronic and the dark-matter densities.

As 'astro-physics'² should have been a natural subfield for the European Physical Society (EPS), it was deemed appropriate to create an "Astrophysics" Division shortly after the society's founding. However, only solar physicists found their niche there. Night-sky astronomers were — as far as conferences were concerned — mostly oriented towards the US. Therefore, astrophysics within EPS was, for a long time, limited to the activities of the "Solar Physics" Section. When, in the early nineties, the European Astronomical Society (EAS) was in the process of being created, EPS decided to make a special effort in astrophysics. At that time already it was often hard to distinguish astronomy from 'astro-physics' and, therefore, it was decided to act together and create a Joint Astrophysics Division. EPS and EAS entered into a five-year agreement for that purpose in 1992. This agreement has in the meantime been extended for another five years.

The purpose set for JAD, with sections administered either by EPS or EAS, and welcoming members from both societies, was to deal with those topics that benefit from a close collaboration between physicists and astronomers. The joint division has the role of harmoniously co-ordinating the relevant activities of the two societies in that domain, a domain which lately has been expanding, if not exploding, with research on the ground, underground and in space. Such a multidisciplinary activity is not isolated. Back in 1995, ESA created a new Fundamental Physics Advisory Group in addition to its already existing Working Groups on Solar System science and Astronomy. This budding new field was being exemplified and thus defined by a remarkably large number of proposals for space missions, and steps were taken to introduce young researchers to the new field at the 1997 Alpach Summer School [2]. CERN recently set up the concept of "recognised experiments" for projects corresponding to European collaborations involving particle physicists engaged in astroparticle physics research. The AMS experiment (search for antimatter in space), the Auger project (detection of very high-energy cosmic rays) and the LISA project (search for gravitational waves in space) are already such "recognised" experiments. Although they do not receive any CERN funding,



Following the last meeting of the JAD Board in L'Aquila, members visited the Gran Sasso Laboratories together with their guest, the President of EPS. From left to right: Bernard Schutz, Martial Ducloy, Martin C.E. Huber, Daniel Enard, Jean-Pierre Swings, Jan Kuijpers, Roberto Grillo.

they can use the organisation as a base for their international collaboration.

First chaired by Pierre Léna and then by Martin Huber, JAD has not yet reached cruising speed, and the meetings of the Division Board are still to some extent brainstormings. These meetings take place in different key sites for the community. Past ones were held at ESA/ESTEC (Noordwijk), at CERN and, most recently at the Gran Sasso Laboratories. The next one will be at ESO (Garching).

The field is captivating and thus thriving. Searches for gravitational waves are in a promising development phase. At long last one can match expected signals with achievable detector responses. Instrumentation developed in accelerator-based physics is opening up new windows in astrophysics. Extremely violent events, such as the merging of neutron stars and, even more so, that of very massive black holes, provide (or are soon to provide) data that should improve our understanding of gravitation. The Universe is rich with sources of very-high-energy particles, which are hardly — if at all — understood. The domain covered by JAD with such fascinating questions should be a beacon one, quite capable of attracting young people to physics. It is a challenge to make this division work in the best possible way for the benefit of a fast-moving multidisciplinary community.

References:

- [1] Fundamental Physics in Space and Related Topics. ESA-CERN Workshop, ESA SP-469 (2001).
- [2] Fundamental Physics in Space, 1997 Alpach Summer School, ESA-SP-420 (1997).

¹ In order to facilitate a more extensive collaboration, the large European International Research Organisations (EIROs) have recently created the EIROFORUM. The Forum, consisting of the Directors General of the European Organisation for Particle Research (CERN), the European Molecular Biology Laboratory (EMBL), the European Fusion Development Agreement (EFDA), the European Space Agency (ESA), the European Southern Observatory (ESO) and the Institut Laue-Langevin (ILL), meets bi-annually to review and pursue issues of common interest. By exploiting the links between the Organisations and their respective European research communities, they will thus mobilise the substantial combined expertise in basic research and in the management of large international projects for the benefit of European research and development.

² A hyphen is used here in 'astro-physics', in order to convey the difference to astrophysics, a sub-discipline of astronomy. Astrophysics began with the development of spectroscopy in the nineteenth century. One of its main aims was determining the abundance of the chemical elements. Today, the expression is often used arbitrarily to describe investigations that are based on a combination of methods employed in physics and astronomy.