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## **ESOF2006 SPECIAL EDITION NEWSLETTER – 002**

### **FEATURE ARTICLE**

#### ***The Origin and Future of the Universe***

Cosmologists can now say with some confidence that our Universe consists of 5 percent of matter like that of which we are made, 25 percent of some other, still unknown, form of transparent matter, and 70 percent of a still mysterious form of dark energy, which is controlling the fate of the Universe. Each step in our growing knowledge corresponds to a developing appreciation of the (lack of) significance of our direct `common sense' view of nature.

Millennia of study by the greatest minds led, by the 16th century, to a Universe with Man at its head and its centre, with all Creation subject to Mankind's desires – an approach still often evident in global planning. Precision large-scale science then arose, rapidly leading to Copernicus and Newton, and our eventual realisation that observation and analysis required a quite different description of reality. The `Copernican principle', which is essentially that any explanation for an observation or event which requires a special role for Man or a deity is wrong, has since been applied with great effect, leading to the startling practical and conceptual successes of modern science, and its technological offspring. Astrophysics has extended this Copernican discovery concept so far that we know, as noted above, that everything that we see in the Universe, and the very type of matter of which we are made, is an almost insignificant perturbation on a deeper and very different reality.

Yet we are able to describe much of the past history of the Universe, from its origin as an imperfect fluctuation in nothing, to the present when gravity has lost control of the fate of the Universe, to consider why the laws of physics allow a Universe which supports life, and to consider possible far futures.

For more information on this key-note lecture, please click [here](#).

*Written by Prof. Dr. Gerry Gilmore*

### **EDITOR'S CHOICE**

#### ***Fusion research: bringing the sun down to earth***

For more than half a century, scientists have been striving to gain energy from nuclear fusion.

Using the heat energy that is released when two nuclei join together to form a heavier nucleus (as happens in the sun), seems ever more attractive in times of global warming and increasing demands for energy: Nuclear fusion power would be widely available, with basically unlimited supply and comparatively promising environmental and safety characteristics.

However, as the time-span indicates, to bring the sun down to earth is an extraordinarily challenging project. For example, to ignite the fusion fire the fusion fuel plasma composed of the hydrogen isotopes deuterium and tritium has to be confined in a magnetic field cage



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and heated to temperatures of more than 100 million degrees Celsius – more than six times the temperature of the core of the sun.

In the past decades, fusion research has made substantial progress; in particular physical questions have been solved. Fusion has been achieved in several fusion devices. However, in these relatively small experiments, more energy had to be invested to induce the reaction than could be gained from fusion. Researchers intend to finally obtain net energy from fusion with the world-wide ITER cooperation, the first experimental fusion reactor which will be constructed in France – and thus experimentally prove that nuclear fusion can provide energy here on earth.

Even though the construction of ITER takes fusion research into its realization phase, it will at best take another 50 years before all technological questions are solved and nuclear fusion power can keep our lights on.

For more information on this scientific session, please click [here](#)

*Written by Barbara Schwerdtfeger*

### ***Meeting of Minds: Citizens ask scientists***

Can technologies or drugs change or control our brains – and what would it then mean to be human? Brain science develops rapidly, but the ethical, societal and economical implications of these innovations have not yet been discussed much in Europe. For that reason, the King Baudouin Foundation chose brain science as the topic for the first public deliberation on scientific developments at European level. Through a series of national meetings and two European citizens' conventions, randomly chosen people from nine countries first learned about brain science and then discussed with scientists, representatives of NGOs and industry its possible implications for society. After intense discussions, the citizens agreed on recommendations for the further development of this field of research.

While some scientists remain sceptical of the need for public deliberation, for those who came it was a positive experience. "The interaction between citizens and experts generated a sort of collective wisdom" says session chair Gerrit Rauws. "Some people would expect that people ask without nuance for more regulation and control or want to limit the impact of the pharmaceutical industry on research. In reality, most recommendations show a well balanced combination of vigilance and trust. That is relevant policy information and also very relevant for researchers."

After a presentation of the project and interviews with participating citizens and scientists, the session is concluded by a panel discussion on the limitations and potential policy impact of public deliberations.

For more information on this scientific session, please click [here](#)

*Written by Renate Ell*

### ***Life on the ridge: microbes, mining, management and more***

"Scientists have mapped more of the surface of Venus than of Earth's ocean floor" says Kristen Kusek, chair of a session on the last "terra incognita": the ocean ridges. Only 1% of these 70.000 km of submarine mountain ranges have been visited by scientists to date. The



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most fascinating spots are those featuring volcanic activity, such as the 'black smokers' – which act like windows into the interior of the Earth. These spots are among the world's most difficult places to research: The water temperature can be hot enough to melt lead and contains a mixture of chemicals that would be toxic to life as we know it on Earth's surface; and the pressure at the seafloor is equivalent to some 50 jumbo jets sitting atop a human being. However, a surprising number of animals and microbes thrive in this environment. Their enzymes could be useful in biotechnological innovations, maybe enhancing environment clean-up efforts. Mining companies are interested in the minerals that accumulate around the vents: copper, zinc, lead and silver sulfides together with gold.

Turning a spotlight onto this hidden world is the fact that deep sea science is now intersecting with policy: A code of conduct has been set up for responsible research practices, and some ridge systems have been designated as Marine Protected Areas, analogous to nature reserves on land.

This session brings together all stakeholders to discuss the science, policy and management of these fascinating and mysterious environments.

For more information on this scientific session, please click [here](#).

*Written by Renate Ell*

## **ESOF2006 NEWS**

### ***Young scientists and journalists are the centre of attention at ESOF2006!***

The Euroscience Open Forum 2006 particularly focuses on young scientists, young journalists and students. For this purpose, we have compiled an extensive Career Programme as well as a series of exciting events:

- Skill development workshops and educational seminars in co-operation with Naturejobs, the German science writers association TELI, the World Academy of Young Scientists (WAYS), EMBO and Karolinska Institutet. For more information, click [here](#).
- Tours of the ESOF2006 Press Room for young journalists and students. For more information, please contact [effrosyni.chelioti@w-i-d.de](mailto:effrosyni.chelioti@w-i-d.de).
- Science cafés promoting dialogue and exchange with prominent scientists and the public (integrated in the Outreach Activities).
- Surprise events to be announced shortly before the conference!

To encourage participation, ESOF2006 has secured travel grants for young scientists and researchers sponsored by the Stifterverband für die Deutsche Wissenschaft, UNESCO-Roste, the Swedish Söderberg Foundation and the German Wilhelm und Else Heraeus Foundation. For more information on travel grants, please click [here](#).

Germany offers young people high-level educational and professional opportunities. The exciting portal [www.young-germany.de](http://www.young-germany.de) (an initiative of Germany's Federal Foreign Office and its partners) provides compact information on everything from travelling to working in Germany.