

Olympics of Fusion Energy Research

New Enthusiasm Pervades International Fusion Meeting

A marathon six-day meeting of the world's leading fusion researchers drew to a close on 16 October 2010. At the 23rd IAEA Fusion Energy Conference, more than 1 200 scientific experts met in Daejeon, the Republic of Korea, to discuss how to use nuclear fusion to produce energy on a sustainable, commercial basis. Known as the "Olympics of Fusion Energy" the IAEA Fusion Energy Conference, or FEC, is the fusion community's premier international conference, meeting every two years since 1961. The Daejeon session drew together more scientists and papers than any previous FEC.

Fusion research has expanded significantly since the most recent FEC held in Geneva in 2008. With a flood of over 600 scientific papers, the programme committee worked hard to deliver a comprehensive programme that provided scientists with the most significant advances an opportunity to offer lectures on these developments. At the Conference the broad range of research topics, together with detailed up-dates on progress made by every major fusion device in the world, demonstrated vividly that fusion is a global passion.

Fusion projects are now found around the globe in both developing and developed countries, including among others: the Experimental Advanced Superconducting Tokamak (EAST) in China, the international project ITER, based in Cadarache, France, the Korea Superconducting Tokamak Advanced Research (KSTAR), the SST-1 in India, the Joint European Torus (JET), the Large Helical Device (LHD) in Japan, the National Ignition Facility (NIF) and the Doublet III D Tokamak (DIII-D) in the United States. Researchers said that the results from these devices are making significant contributions to resolving open issues on the way to achieving controlled fusion energy production.

The Conference also highlighted developments in the theory of both magnetic and inertial confinement fusion with, in particular, an emphasis on increased modelling capabilities for physics and technology processes pertaining to the large-scale experimental reactor, ITER. Although the theory is largely inaccessible for a lay audience, these Fusion Energy Conferences are driven by the search for solutions to inescapable, everyday realities such as the approaching end of the fossil fuel era and increasing climatic instability.

World leaders in fusion research shared their conviction that fusion would provide a source of clean fuel derived from resources as cheap and easily accessible as sea water. Summing up the thinking that gives the topic its current urgency, Werner Burkart, IAEA Deputy Director General for Nuclear Applications, called upon the participants “to pursue global partnerships for fusion energy development, in order to ensure a sustainable energy future for all of us.”

One highlight of the Fusion Energy Conference is the celebration of excellence in research. The IAEA’s journal, *Nuclear Fusion*, the journal of record for the fusion community, grants each year the Nuclear Fusion Award, presented every two years at the Conference. The journal's co-publisher, the Institute of Physics, provides \$2 500 to each winning author.

John E. Rice received the 2010 award. Rice is a world-renowned plasma physicist, a Principal Research Scientist, on the Alcator Project at MIT’s Plasma Science and Fusion Center, Cambridge. He received the award as the lead author of a seminal paper that analyses results across a range of machines in order to develop a universal scaling that can be used to predict intrinsic plasma rotation. This paper stimulated a wealth of theoretical and experimental work.

Finally seeing his award, a year after its announcement, Steven A. Sabbagh received the 2009 award as the lead author of a landmark paper which reports record parameters of beta in a large spherical torus plasma and presents a thorough investigation of the physics of Resistive Wall Mode (RWM) instability. The paper makes a significant contribution to the critical topic of RWM stabilization.

Building a viable commercial fusion reactor to produce power for everyday needs is by necessity a project that must be planned over several generations. Two days before the Fusion Energy Conference began, the International Youth Conference was held with 200 college and high school students. These young researchers are already referred to as the “ITER” generation. It will fall to these young researchers to transfer the knowledge won during ITER’s operation, beginning in 2019, to a demonstration reactor that can prove that fusion energy production is commercially viable.

Since its first meeting in 1961, the Fusion Energy Conferences have served the fusion community and the general public by helping to make the dream of clean, limitless power generation become reality.

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