

For Media Release:

Attention is given to a rather shocking new discovery: NUCLEAR ENERGY WITHOUT RADIOACTIVITY. Everyone would say this is absolutely impossible because nuclear reactions are always considered to be accompanied with most dangerous radiation. But this radiation hazard is exceptionally low if a reaction is free from neutrons, e.g. the reaction of protons (nuclei of the usual light hydrogen) with the boron isotope 11, (HB11 reaction) which primarily is free from any nuclear radiation apart from not very energetic x-rays which may be screened. Secondly there are few reactions, but pro generated fusion energy, this radioactivity is less than burning coal because it naturally contains 2 parts per million (ppm) of uranium. This amount of radioactivity was and is well negligible.

Fusion energy with the clean reaction product, the ash, of helium is nearly unlimited available and everywhere accessible. Up to the present, however, it was never possible to ignite a reaction for getting more energy out than one had to put in for the ignition apart from the uncontrolled reaction ignited in hydrogen bombs. However, the historically very first energy producing *controlled* reaction with ignition by lasers may really happen within the next few months in the Lawrence Livermore National Laboratory (LLNL) near San Francisco. The laser for this purpose is now ready (D. Kramer, Physics Today, May 2009, p. 28) and is called NIF (National Ignition Facility). It is the largest laser on earth and had cost about 4Billion US-dollars. The laser pulse of about few billionths of a second duration produces 500 times more power than all US power stations.

These laser pulses are to ignite fusion fuel of few Millimeter diameter, consisting of nuclei of heavy hydrogen, called deuterium D, which is in all water to react with super-heavy hydrogen, tritium T which however is radioactive, has to be handled carefully and is poisoning the reactor to some controllable extend. Nevertheless the DT-fusion may be a solution for unlimited, safe and carbon-free energy production. LLNL has developed diode-pumped very compact glass lasers for a prototype of a power station in about 2020. This project LIFE (laser induced fusion energy) was presented at a conference 6-11 September 2009 by Eric Storm in San Francisco. This conference (Inertial Fusion Science and Applications: IFSA 2009) was the largest of this kind with 600 participants.

Apart from this very advanced and highly explored technology with *spherical compression of fusion fuel by lasers*, the last years' development arrived at more compact lasers producing nearly ten times higher powers than NIF but for more than thousand times shorter pulses. Using a recently discovered anomaly with exceptionally clean laser pulses of this kind, may lead – and this is just at the beginning of research – to a very simplified ignition of DT. To a further surprise, when using this scheme of fusion of the miraculous HB11 fuel at solid state or

little higher density may lead to *nuclear energy without radioactivity*. This should be less than about 10 times more difficult than igniting DT-fusion. This was rather unexpected, because HB11-fusion by spherical laser compression as in NIF would have been 100,000 times more difficult than DT-fusion. Indeed this is a beginning only and more details about this mechanisms need now to be explored.

A general report was printed in the magazine “Australian Physics”, July-August 2009, pages 111-113, and scientific articles after careful refereeing were published in “Optics Communications”, Vol. 282 (2009) p. 4124 and in “Laser and Particle Beams” Vol. 27 (2009) p. 495.

Heinrich Hora, 24 September 2009

h.hora@unsw.edu.au, herbitz@yahoo.com

Tel. 95444432, 46277769