Physics Nobel Prize 2018 supports fight against Climatic Catastrophe

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The most distinguished award of the Nobel Prize in Physics 2018 to the laser pioneers Gerard Mourou and Donna Strickland was deserved in an ideal way. One of the numerous applications of their discovery of CPA (Chirped Pulse Amplification) of most extreme laser pulses opens the solution of absolute clean and low cost generation of electricity by CPA against the Climatic Catastrophe. The trace goes back to nobody less than Albert Einstein who in 1915 discovered how heat radiation needed the fixed piece rating or quantizing of action discovered before by Max Planck. This was the basic mechanism for the laser verified by Charles Townes. Mourou and Strickland discovered in 1985 how laser pulses could be made shorter and shorter and more and more intense. The record can be seen today by the lasers of the National Energetics Corporation in Austin/Texas for durations of a millionth of a millionth of a second (picosecond) and even much shorter. During this extremely short time, the power of the pulse is increased to about 1000-times higher than from all electric power stations on earth that these are generating continuously and not only during the mentioned extremely short time.

These extreme laser pulses can be used for applications that were unthinkable before in researching for new kinds of materials, treating cancer, improving eye sight, use for checkouts at nearly all supermarkets etc. etc.. Another ingenious application is the just reached level, how electric power can be produced for the first time in a controlled and safe way from nuclear fusion energy at low cost.

Our modern wealth and civilization is based on the use of burning coal for generating mechanical work and energy of motion since the steam engine was discovered by James Watt about 250 years ago. The emission of the burned product, the carbon-dioxide, into the atmosphere could be tolerated until 1960 but the present five times higher emission will run into melting of glaciers, changing of the climate and strongly rising of the ocean level. Since Lord Rutherford’s discovery of nuclear energy 115 years ago, the energy from reacting nuclei provides 10 million times more energy than the chemical source by burning coal. The difficulty only is that the igniting temperature of coal of up to 1000 degrees centigrade – in contrast – needs a nuclear fire at 100Million degrees.

Instead of these astronomic temperatures, Otto Hahn’s discovery of splitting (fission) of the heaviest nuclei of uranium permits the energy gain at temperatures in reactors that work in a controlled way, such that today more than 10% of all electricity is produced from uranium fission. The disadvantage is the danger of the resulting radioactive ash and if the control has been intentionally been reduced that a catastrophic reactor meltdown happened two times, at the Three Miles Island and at Chernobyl.

Another way to gain nuclear energy happens in stars at the very high temperature where light nuclei are joining to lager nuclei. This is nuclear fusion as example in the center of the sun, the slow burning of hydrogen into helium occurs at the temperature of 15 Million degrees. For similar reactions one needs temperatures of 60 Million degrees or more. Very expensive research for such fusion reactions in a controlled way are studied since 1950 but no conditions of a reactor have been reached yet, neither by confining this process using magnetic fields for continuous burning, nor by controlled micro-explosions ignited by lasers. A first basic type of reactors is expected not before the next 20 years possibly followed by a much later economic reactor scheme.

It is just now thanks to the most extreme laser pulses following the initially mentioned discovery of CPA, that laser pulses can produce the controlled micro-reaction with fusion of ordinary hydrogen with boron nuclei showing in experiments according to processes measured now and expected from computer results since 1978, that the use of the 80% type of boron with the number 11 can be used for a reactor without the problem of nuclear waste generation and avoiding the melt-down risk of nuclear fission, to produce electricity at considerably lower than present days cost sustaining for the next 10,000 years.

The initially mentioned most extreme power of laser pulses of picosecond duration have – thanks to the just celebrated discovery of CPA – produced higher pressures than the necessary pressures with the astronomic temperatures of hundred million degrees for igniting the fusion. This non-thermal pressure of the laser pulses dominate against the usual thermal equilibrium and result in nuclear fusion at conditions for a controlled and safe reactor.

Details are published and explained at Google under “Laser Boron Fusion” or the “HB11 Energy” process with a good chance that the final reactor prototype may be available within about eight years. The basis is given by the world patent WO 2-15/144190 A1 that has been granted in China (No. 2905560) and procedures are in other countries. The basically new process consists in the fact that instead of the pressures with the astronomically high temperatures, the CPA laser of the Mourou-Strickland type produces higher pressures by the non-thermal forces determined by the forces of the laser field. The predominance of these “nonlinear forces” are known from computations since 1978 [1], first measured and confirmed by Roland Sauerbrey in 1996 as ultrahigh plasma block acceleration [2][3][4] with a measured energy output billion times higher than at classical equilibrium[5]. An advantage is the avalanche multiplication hydrogen-boron reaction HB11 [6] opening the road map for producing electric energy: clean, safe, low cost and lasting [7].

The most critical situation with the climatic catastrophe can be seen by news from Bangladesh October 2018. The level of the Ocean has risen to such extend that very large areas of farmland have been lost and could not be saved by dams against flooding from the ocean. It was mentioned that 80 Million persons my fear to be expelled from their homes next. It does not help that the Climate Conference COP with 25000 highly paid participants met at the conference in Bonn 2017, adding with their expenses to the costs of more than $200 Billions invested yet with the result that it is discussed whether the average global heat increase should be 2 or better 1.5 degrees. Buchal [8] critisizes the German Chancellor that in order to keep her in power, she was ordering the shutting down of indispensable nuclear fission power stations after experts in Japan had forgotten, to built the wall in Fukushima against Tsunamis half meter higher. The solution with clean and low-cost energy using laser boron fusion against the climatic catastrophe is promoting with HB11 Energy P/L for the very first time how such fusion reactors are working at modest temperatures similar to fission reactors thanks to the fulminant discovery of CPA. These have reached now the level of laser technology to be marketd.

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