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IZEST Letter of Intent

Dear Professor Mourou

By this letter my research group – the Virtual Laser Plasma Laboratory group (VLPL-group) - wants to express our enthusiasm to join the International Zetta-Exawatt center IZEST, which was created a year ago (Nov29th 2011) under the initiative of the ECOLE POLYTECHNIQUE and the COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES.

The VLPL groups subscribes fully to IZEST mission that is:

1. to definite novel laser architectures and road map of the next generation of ultra-high peak power/Intensity and also the High average power lasers.
2. to facilitate the scientific and technical coordination among members of the international scientific community eager to discover new paradigms under pinned by extreme high intensity lasers. Particular attention will be devoted to:
 - prompt acceleration
 - high energy fundamental physics, physics beyond the Standard Model
 - vacuum structure
 - dark matter search
 - TeV Astrophysics and to the development of very high intensity lasers.
 - societal application like proton therapy, nuclear transmutation.

The VLPL research group of Prof. Pukhov is located at the Institute for Theoretical Physics I at the Heinrich Heine University Dusseldorf, Germany. It has the expertise in theory and large-scale numerical simulations of laser-plasma interactions at relativistic intensities. It has discovered the bubble regime of electron acceleration and developed a relativistic similarity theory to derive the scaling laws. It also pio-

neered the work on high harmonic generation from overdense plasma layers and predicted universal power-law spectra observed later in experiments.

The contribution of Prof. Pukhov VLPL-group to IZEST will be in theory and simulations of:

- novel sources of short wavelength radiation,
- particle acceleration to 100 GeV energy levels and beyond,
- QED effects in ultra-strong fields.

The VLPL group of Prof. Pukhov will actively seek EU and National funding in the IZEST's relevant area of interest.

The research group of Prof. Pukhov is expected to be an active member of the participant council formed by the heads of the IZEST supporting laboratories. By meeting twice a year the participating council will help to define IZEST's strategy before it is submitted for approval by the steering committee composed of the Ecole Polytechnique and the CEA. The participant council provides also constant scientific and technical guidance to its management.

Sincerely



Prof. Dr. Alexander Pukhov