Current state and future of research Inertial Fusion Energy in Europe

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The recent achievement of ignition at the National Ignition Facility sets a historic milestone in fusion research. This paves the way to using laser fusion as a viable approach to future energy production. However, it does not seem possible to extrapolate the indirect drive scheme used at NIF to energy production due to complicated targets, intrinsic low efficiency, and implication for defense programs. Direct laser drive and in particular the shock ignition approach appear as the needed pathway towards Inertial Fusion Energy (IFE).
The talk will revise the progress in studying inertial fusion physics in Europe in the framework of EUROFusion Enabling Research Projects. After, I will present the proposal (HiPER+) for establishing a European program on IFE with the mission to demonstrate laser-driven ignition in direct drive and develop pathway technologies for the commercial fusion reactor. The proposed roadmap, published in HLPSE in 2023 [1], is based on four complementary axes: i) the physics of laser plasma interaction and burning plasmas, ii) high energy high repetition rate laser technology, iii) fusion reactor technology and materials and iv) reinforcement of the community by international training programmes. We foresee collaboration with universities, research centers and industry and the establishment of joint activities with the private sector involved in laser-fusion. Along with the expected high level socio-economic impact, this project aims to stimulate a broad range of high-profile industrial developments in laser, plasma, and radiation technologies.

Acknowledgement
This work has been carried out within the framework of the EUROfusion Consortium, funded by the European Union via the Euratom Research and Training Programme (Grant Agreement No 101052200 — EUROfusion). Views and opinions expressed are however those of the author only and do not necessarily reflect those of the European Union or the European Commission. The involved teams have operated within the framework of the Enabling Research Project: ENR-IFE.01.CEA “Advancing shock ignition for direct-drive inertial fusion”.

References
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