



High Energy Particle Seminar

“Plasma wakefields – a revolution in particle acceleration”

New acceleration technology is mandatory for the future of particle physics. A promising approach is to exploit the properties of plasmas. Past research has focused on creating large-amplitude plasma waves by injecting an intense laser pulse of an electron bunch into the plasma. However, the maximum energy gain of electrons accelerated in a single plasma stage is limited by the energy of the driver. Proton bunches, being much more energetic, are the most promising drivers of wakefields to accelerate electrons to the TeV energy scale. An experimental program has started at CERN, the AWAKE experiment, where proton bunches will be used for the first time ever to drive plasma wakefields. The evolution of the properties of the proton and electron bunches in the plasma will be studied using state-of-the-art diagnostic tools and will be compared to detailed numerical simulations. This information will provide the basis for designing next-generation experiments. The presentation will include an introduction to the subject of plasma wakefield acceleration and a description of the experimental program at CERN, as well as a discussion of future outlook.



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