



John Adams Institute for Accelerator Science Lecture Series

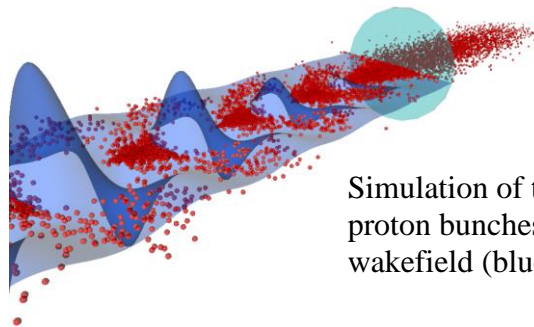
Thursday 26th January 2017 at 4:15 pm
Seminar Room, Denys Wilkinson Building

AWAKE, the Advanced Proton Driven Plasma Wakefield Experiment at CERN

**Edda Gschwendtner,
CERN**

Abstract:

The construction of ever larger and costlier accelerator facilities has its limits, and new technologies will be needed to push the energy frontier. Plasma wakefield acceleration is a rapidly developing field which appears to be a promising candidate technology for future high-energy accelerators. The AWAKE experiment at CERN is the world's first proton driven plasma wakefield acceleration experiment, using a high-energy proton bunch to drive a plasma wakefield for electron beam acceleration. The AWAKE experiment, was approved in August 2013, and the construction, installation and commissioning have been completed as scheduled in 2016. In 2016 AWAKE has achieved a major milestone and observed the strong modulation of high-energy proton bunches in plasma; the results represent the first ever demonstration of strong plasma wakes generated by proton beams. This is a significant step towards the goal of using the proton-driven plasma wakefield technique to accelerate electrons. The AWAKE facility, the commissioning and the first physics run of the experiment are presented. The next steps of the AWAKE experiment are to study the proton bunch modulation in detail in 2017. The demonstration of the acceleration of electrons on the GeV/m scale in the wake of the proton bunch is planned until the Long Shutdown 2 of the CERN accelerator complex at the end of 2018. The plans and challenges for the electron acceleration are explored. A study program towards first applications of the proton-driven plasma wakefield technology in high energy physics is discussed.



Simulation of the interaction between the proton bunches (red dots) and the plasma wakefield (blue waves).