Contribution ID: **233** Type: **Oral presentation**

Overview and first results of the advanced acceleration experiment AWAKE at CERN

Wednesday, 11 July 2018 15:00 (30 minutes)

The Advanced proton-driven plasma Wakefield Acceleration Experiment (AWAKE) [1,2] is a proof-of-principle experiment studying the generation of wakefields by proton bunches as well as the acceleration of electrons in these wakefields. The proton-driven plasma wakefield acceleration (PWFA) promises the potential of accelerating electrons to energies relevant for high-energy physics with a gradient up to GV/m, therefore promising to decrease the length and cost of future colliders. AWAKE uses a ˜12cm-long, 400GeV/c proton bunch provided by the CERN Super Proton Synchrotron. The sharp ionization front created by a 4.5TW, 120 fs laser pulse co-propagating with the proton bunch creates a 10 m column of Rubidium plasma with a density in the 1-10e14/cc range. This ionization front provides the seed for the seeded self-modulation (SSM) [3], which radially modulates the proton bunch into a series of microbunches with a 1-3 mm periodicity. A probe electron beam is injected into the wakefields driven by the microbunches in order to be accelerated.
The very successful experiments started with a study of the proton self-modulation in 2017, and continued with this year's first attempt at electron acceleration. We will introduce the accelerator concept, present an overview of the experimental setup, describe the results of the ongoing experiments and give an outlook for a further development of the acceleration method.

[1] A. Caldwell et al., Nucl. Instr. and Meth. in Phys. Res. A 829 3 (2016).
[2] E. Gschwendtner et al., Nucl. Instr. and Meth. in Phys. Res. A 829 76 (2016).
[3] P. Muggli et al., Plasma Physics and Controlled Fusion 60(1) 014046 (2017).

Primary authors: BRAUNMUELLER, Falk Hans (Max-Planck-Institut fur Physik (DE)); FOR THE AWAKE COLLABORATION

Presenter: BRAUNMUELLER, Falk Hans (Max-Planck-Institut fur Physik (DE))

Session Classification: Workshop on Future of Fundamental Physics