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First experimental results of the AWAKE experiment

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We present the first experimental results on the self-modulation of a long, 400GeV proton bunch in a dense $((1-10)e^{14}/cc)$, 10-m long plasma. These results include evidence for: seeding of self-modulation; appearance of a halo of defocused protons; formation of micro-bunches at the plasma period; modulation period corresponding to the rubidium density, with period measured both in the time domain (streak camera) and in the frequency domain (heterodyne measurements). We will also show occurrence of the hosing instability.

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