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# Experiments using two Bradbury Nielsen gates

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We developed fast switchable Bradbury Nielsen gates for the manipulation of low energy protons and hydrogen atoms. Using a system of two coupled gates operated with a variable time delay, we have built an electronic chopper with opening times in the order of 10-500ns. First use of such a system has been a pulsed proton beam of 500 eV energy with a variable energy spread, which is determined by the time of flight convoluted with frame opening. Post-acceleration can be used to produce a high-energy beam (20 keV in our experiment) with very small relative energy spread. Such a set up can also be used as velocity filter for metastable hydrogen atoms. An application foreseen is the detection of the bound beta decay of the neutron.

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