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Optimisation of the FRANZ chopper system

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At the Frankfurt Neutron Source (FRANZ), it is intended to generate a neutron beam with energies up to 300 keV by a pulsed proton beam with the Li7(p,n) reaction. To prebunch the proton beam for FRANZ, a 6 kV chopper with a repetition rate of 256 kHz and a pulse width of 100 ns has been designed and build. The current pulse generator bases on transformers and therefore forms a clipped and damped sine oscillation. The output amplitude is asymmetric between the positive and negative electrode and the voltage conversion depends upon frequency and primary voltage. As a sine half wave has no plateau, the protons occupy a larger phase space range, which could be cropped by the RFQ acceptance. In order to achieve a higher accelerator transmission, a square pulse would be desirable. A transformer less pulse generator would also generate a more predictable output pulse amplitude, due to the hard coupling of input and output voltage. The recent progress in the field of semiconductor technology made it possible to construct a MOSFET based generator. We present the status of a new designed pulse generator using market available semiconductors for pulsing the FRANZ chopper with a rectangle pulse.

Author: WAGNER, Christopher (Goethe University)

Co-authors: ZERBE, Kristina (Goethe University); IBERLER, Marcus (Goethe Universität Frankfurt); JACOBY, Joachim (Goethe University)

Presenter: WAGNER, Christopher (Goethe University)

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