Contribution ID: **107** Type: **Poster Presentation**

Klystron Modulators for the FAIR pLINAC

Tuesday 5 June 2018 13:30 (1h 30m)

The FAIR accelerator chain comprises a 68 MeV proton injector (pLINAC). Seven identical high power RF systems can supply the RFQ, CCH and CH accelerating structures with up to 2.5 MW. The klystrons require a cathode voltage pulse of -115 kV, 54 A with a flat-top droop of less than 1% over 360 µs. A Klystron modulator has been developed at GSI to meet this demand and two prototype systems are currently under construction in-house.
The selected topology is a capacitor discharge type. A switch-mode current source charges a capacitor bank of 5.4 mF to a programmable voltage of nominally 3.8 kV. A solid state switch assembly generates the output pulse which is stepped up by a ratio 1:33 pulse transformer to the level required by the klystron. The moderate pulse width allows delivering satisfactory flat-top performance without the need for dedicated droop compensation circuitry.
Commissioning of the prototypes is anticipated for the end of 2018 with full availability for operation of the pLINAC RF Test Stand in 2019. Series production of additional seven units will follow.

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Session Classification: Poster 2 - High Voltage Design and Power Modulator Components