

# Pulsed Power Modulators

*Georg Müller, Martin Sack*

KfB-Workshop »Verbundforschung in der Physik der kleinsten Teilchen«

07.09.2020

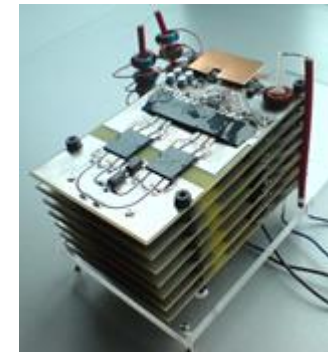
# Pulsed power modulators

## ■ Overall Aim:

- Development of fast-switching semiconductor based pulsed power modulators for FCC kicker magnet systems

## ■ Background:

- Pulsed modulators are basic components of particle accelerators, e.g. for the supply of cavities, kicker magnets, beam deflection systems, etc.
- New semiconductor technologies (e.g. GaN and SiC) now enable a compact and inexpensive construction of fast-switching pulsed power modulators
- Semiconductor-based pulsed power modulators enable an active pulse shaping and thus an instantaneous adaptation of the switching state of the pulse modulators to changes in state in accelerators (tunable, controllable)



*fast MOSFET- switch*



*solid state pulse modulator*

# Pulsed power modulators

## ■ Objectives

- Development and realization of advanced circuitry for solid state fast pulse modulators for kicker systems to:
  - boost pulse parameters (rise time, flattop tolerance..)
  - substitute obsolete technology (thyratrons)
  - increase thyristor switching time by novel triggering approach

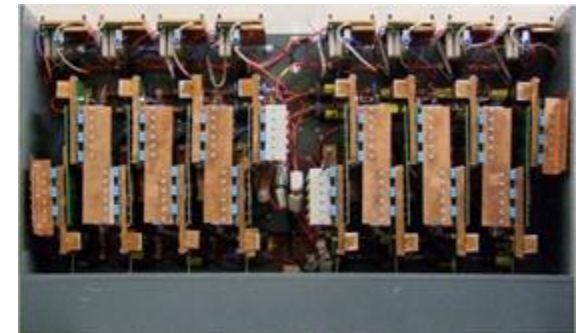


*FCC inductive adder prototype (CERN)*

## ■ Partners: CERN, KIT, ...

## ■ Resources (KIT)

- 1 (scientist), 0.25 (senior scientist), 0.5 (engineer)
- Travel expenses: 10 k€
- Materials (semiconductors, electrical materials..): 90 k€



*Bipolar solid state pulse modulator*

# Thank you for kind attention!

Partners to the project are welcome!

*Georg Müller, Martin Sack*



*Mike Barnes, Thomas Kramer*

