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Event Mode Neutron Imaging with ns Temporal and µm Spatial Resolution

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Recent developments in event driven camera systems allow the construction of a new type of scintillator-based event mode imaging devices. A neutron imaging device employing this new technology to reach high spatial and temporal resolution is currently under development at the NECTAR instrument at FRMII. The goal is for the detector to have a spatial resolution better than 100 µm and a timing resolution of 10 ns. At the same time, the individual neutron detection approach should improve the signal to noise ratio. With high temporal and spatial resolution, the detector can be used in applications where timing and location are critical, such as high-resolution time of flight imaging and modulation of intensity with zero effort (MIEZE).

The structure of the detector consists of a scintillator screen, an image intensifier and a photo-sensitive sensor with single photon readout. A lens is used to collect the light from the scintillating screen on the image intensifier. The setup is flexible and allows an easy change of the scintillator screen and the field of view.

A working prototype has already been built and successfully tested. The current development is focused on determining the properties of different scintillating screens and categorize them with respect to their usefulness in achieving the targeted detector parameters. First results from different scintillators will be presented at the ECNS.

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