Neutron Imaging Detectors

The signal chain

Now let's do it backwards:

- Let's say the lens system projects an area of 0.1 mm x 0.1 mm of the screen onto one pixel of 12 um x 12 um size, we detect several photons per neutron (remember: 177,000 photons are generated in the screen per detected neutron), so the photon statistics does not influence the detected neutron statistics, and the amplification of the camera is set so that it can detect more than 10,000 gray levels – without overflowing, e.g. 4 electrons per gray level.

- So we need 40,000 neutrons per 0.1 mm x 0.1 mm, which is 40,000 x 10,000 neutrons per 1 cm^2, a total fluence of 4x 10^8n/ cm^2.

- In a beam with a neutron flux of 1 x 10^6/ cm^2s, we need 400 seconds or 6 minutes 40 seconds exposure time.

Slide courtesy: Dr. Burkhard Schillinger (FRM-II, Munich, Germany)