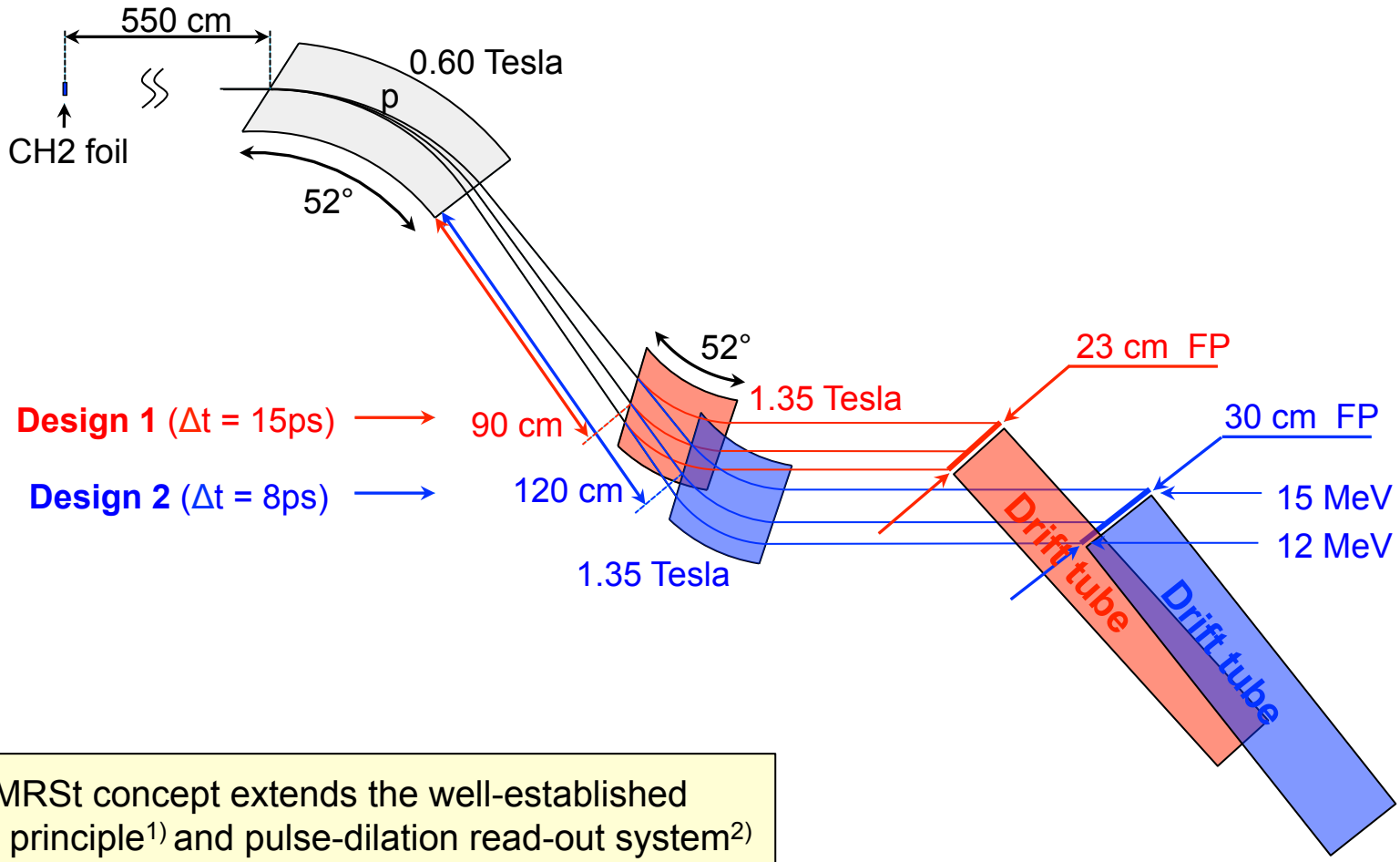
Four talks were given in the Neutron/Gamma 3 session

Frenje	MIT	MRS(t)
Hilsabeck	GA	MRS(t) pulse-dilation detector
Hares	Kentech	10 ps PMTs
Li	MIT	NIF Proton Backlighter

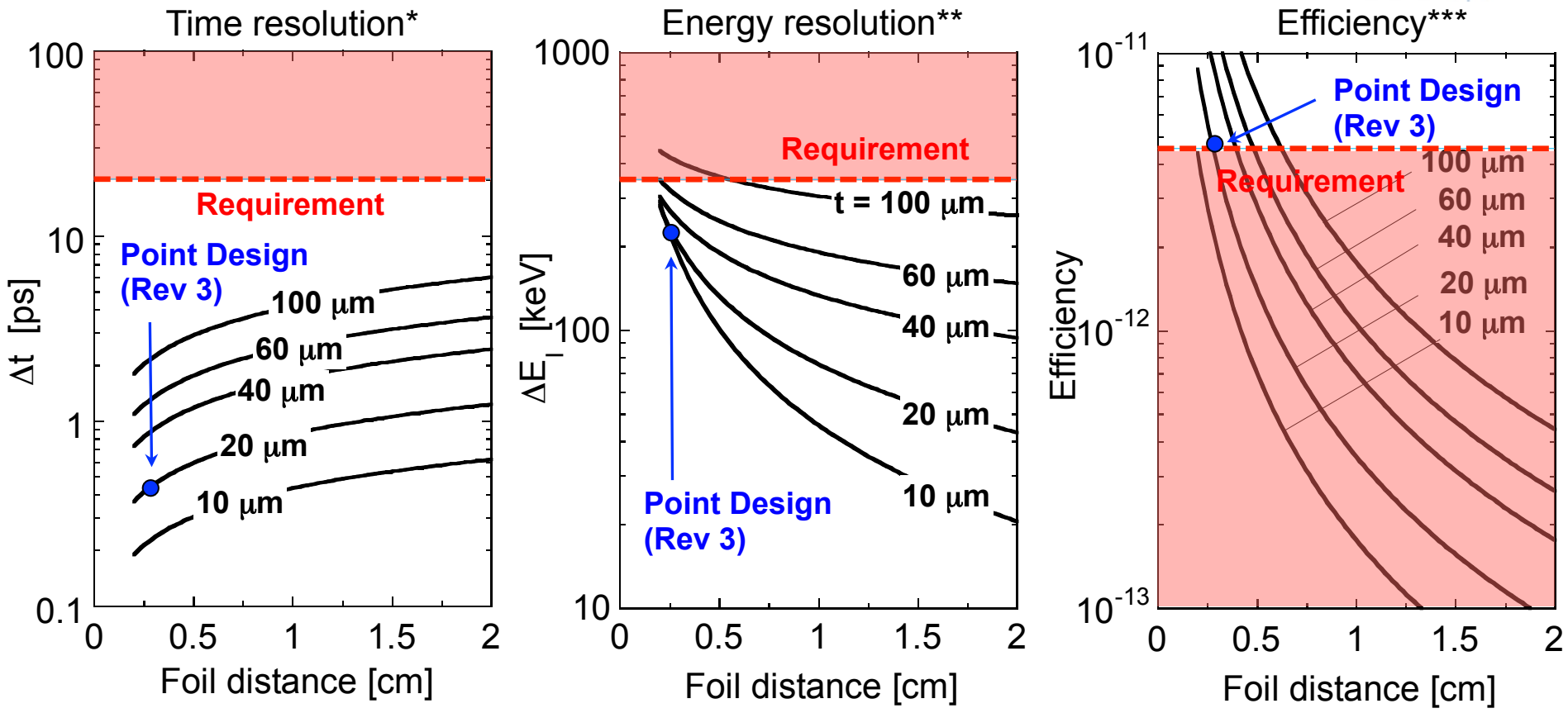
MRSt for time-resolved measurements of the neutron spectrum at the NIF



The MRSt concept extends the well-established MRS principle[1] and pulse-dilation read-out system[2]

[1] Frenje et al., POP (2010); [2] Hilsabeck et al., RSI (2011).

A 1-mm diameter, <100 um thick CH2 foil must be positioned <0.7 cm from TCC to meet the top-level requirements



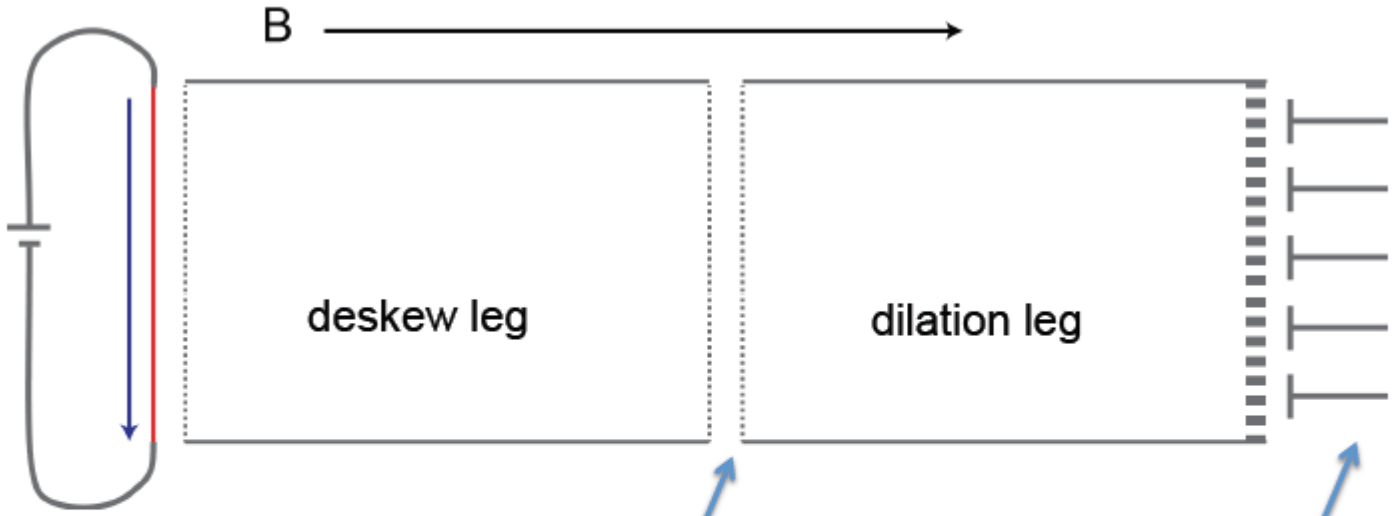
A small CH2 foil very close to TCC is key to the MRSt performance

* Time spread of neutrons producing protons with one energy.
** Energy spread of neutrons producing protons with one energy.
*** A magnet aperture of 2×2 cm^2 was used in these calculations.

MRSt for time-resolved measurements of the neutron spectrum at the NIF

- MRS(t) continues to evolve with version 3 being presented. There has been good progress over the past year with decisions made on the top level physics requirements, foil material, and general magnet configuration.
- A collaboration is in place between J. Frenje and T. Hilsabeck
- Johan will be asking Georg Berg at Notre Dame to review magnet design
- MRS(t) is a Transitional Diagnostic

Staged tube approach to deskew and pulse-dilation

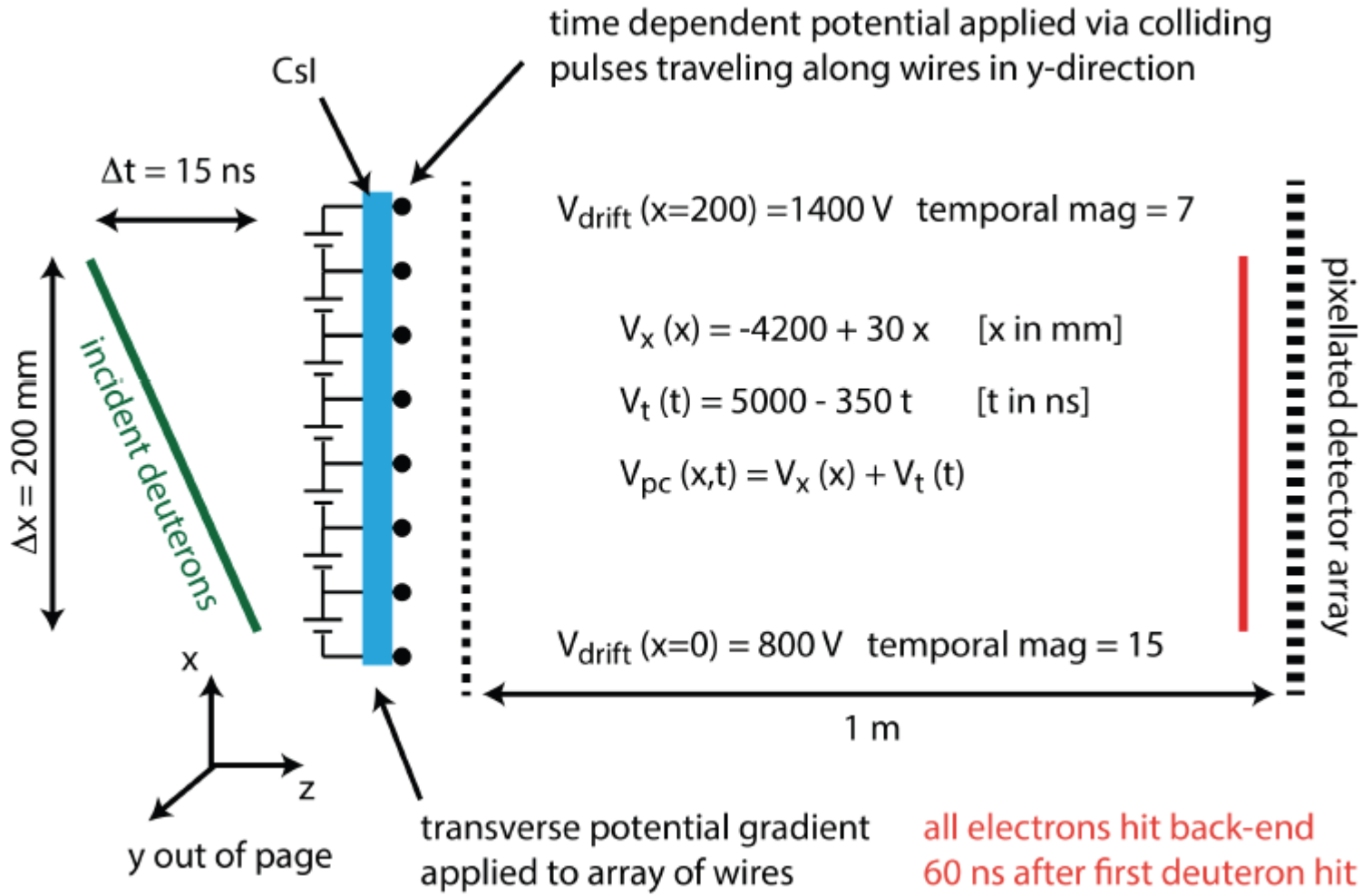


DC voltage gradient applied at cathode. Resulting velocity dispersion removes skew after appropriate drift distance.

All electrons arrive here within 200ps. Fast ramp in the gap dilates the signal.

Multiple anode outputs into digitizer channels record dilated signals in ~40 energy bins

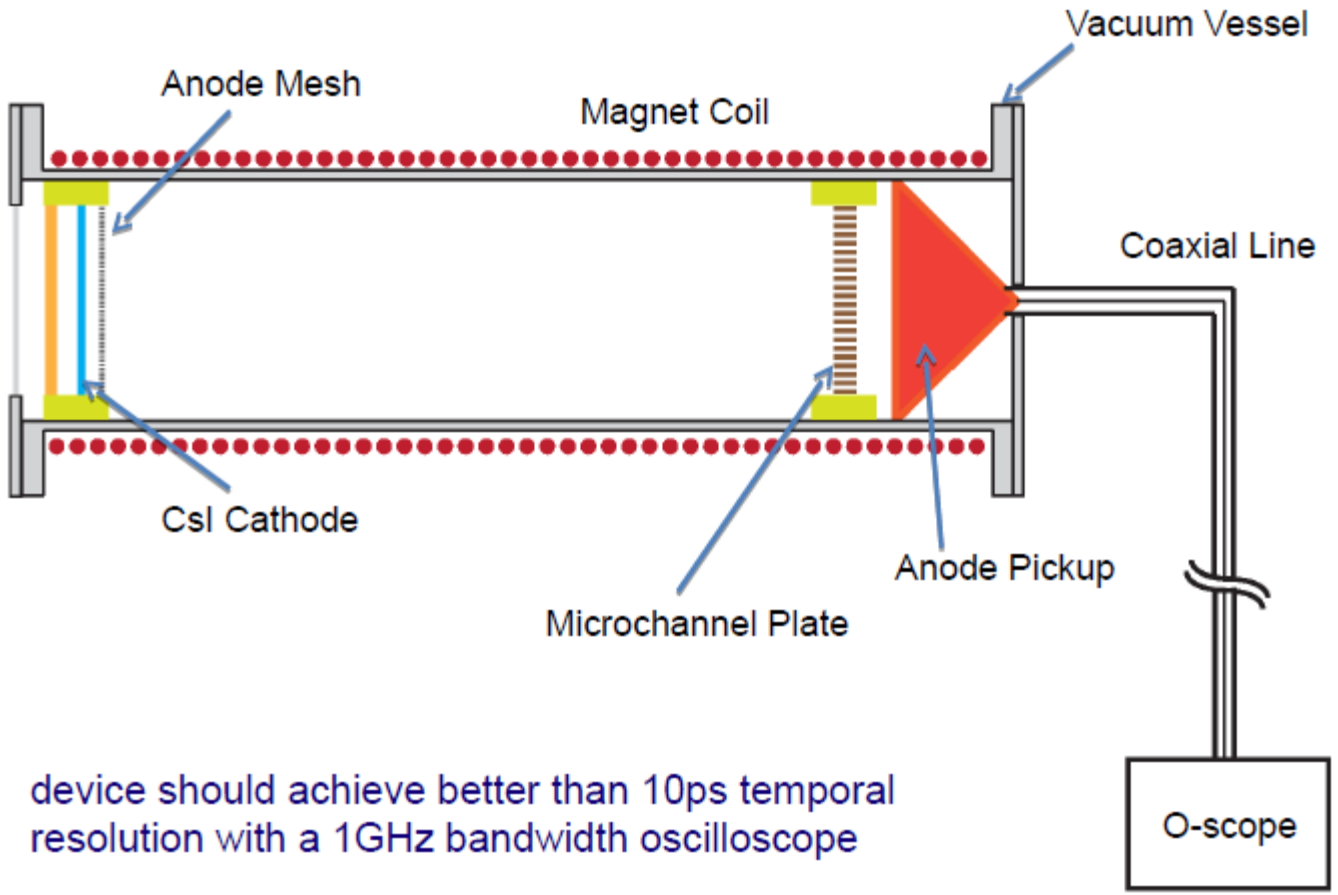
It may be possible to accomplish both functions with a single front-end



A Pulse-dilation detector for MRS(t)

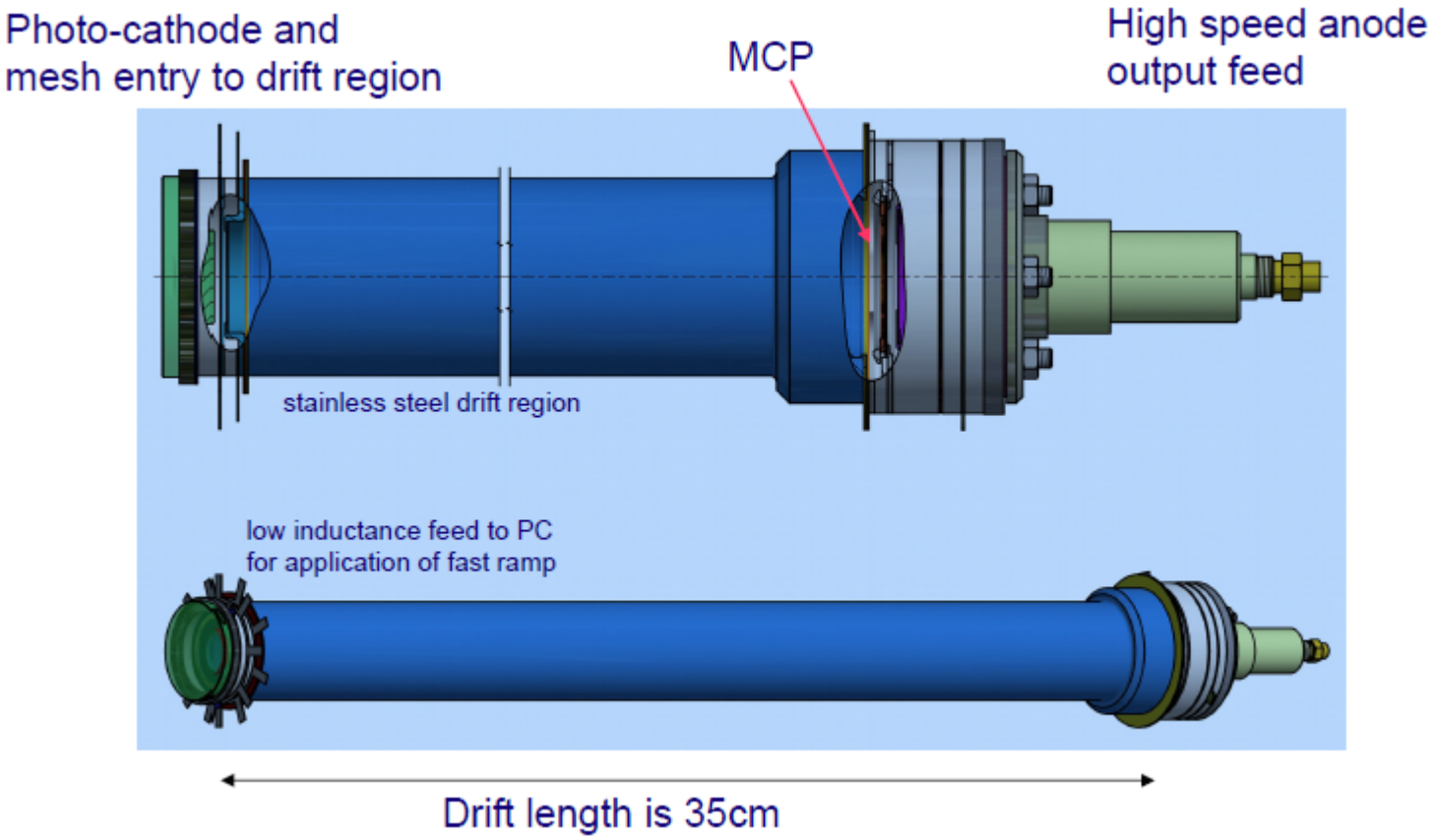
- The initial design is moving forward. The MRS presents a unique set of requirements o the time dilation technology. Requirements for recording the signals have been met in concept and now the design needs to move forward
- The collaboration between J. Frenje and T. Hilsabeck is on going
- Are there better test and calibration facilities that Terry could use?
- This is part of the MRS(t) Transitional Diagnostic

Schematic arrangement for pulse-dilation phototube



device should achieve better than 10ps temporal resolution with a 1GHz bandwidth oscilloscope

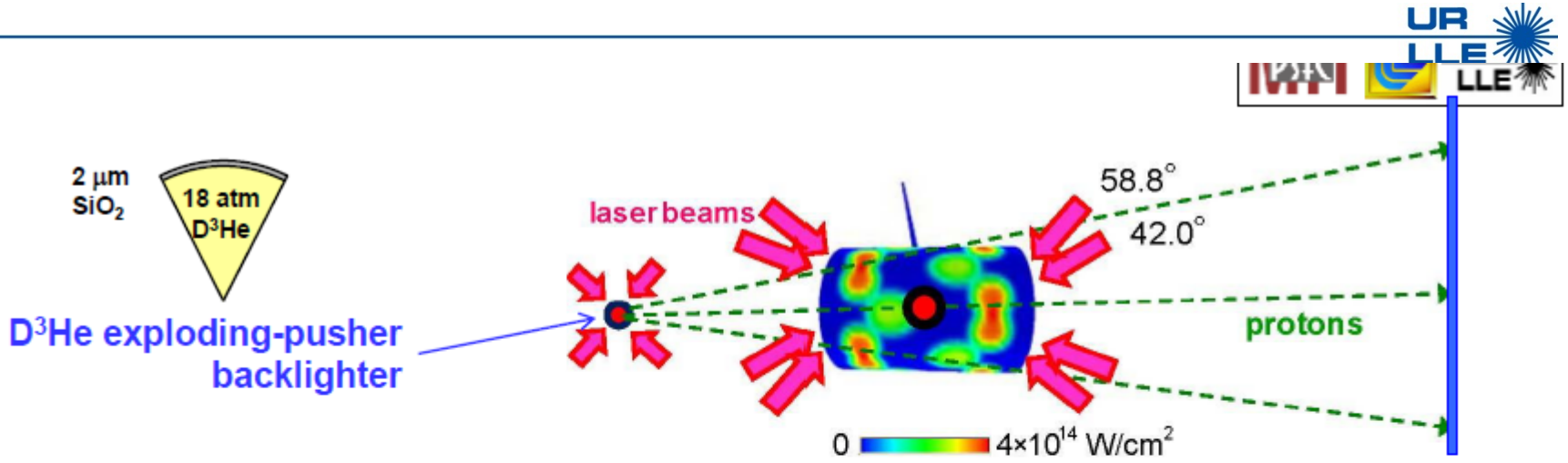
First sealed off tube being built by Photek, based on an existing fast PMT

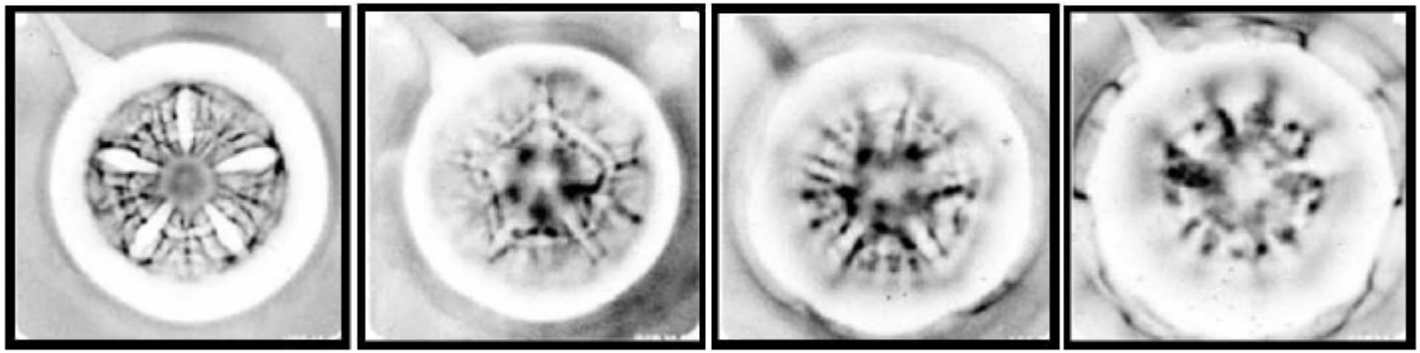


Pulse Dilation Photo Multiplier Tube

- A final design for the tube is completed and fabrication has begun. Initial testing with a modified DIXI has been done at GA. High Voltage ramps have been designed.
- This is a collaboration between Kentech, GA, Photek, LANL, and Sydor
- Kentech is one of the world leaders in high frequency, high voltage ramp circuitry
- This PMT will enhance the LANL GCD data, perhaps making a streak camera recorder unnecessary

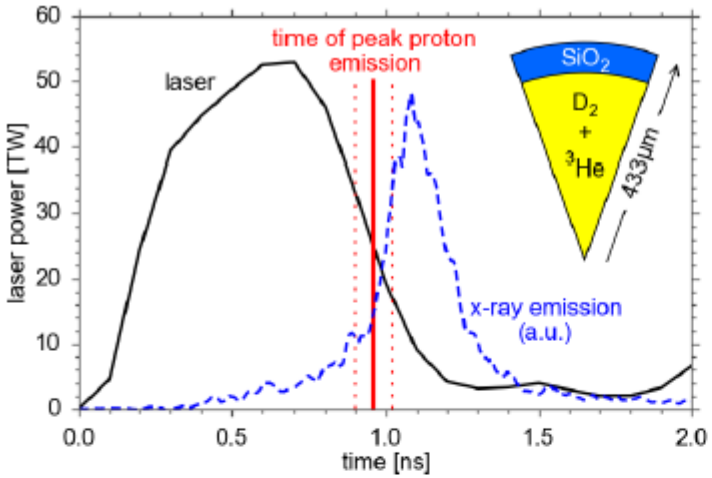
Development of a monoenergetic proton backlighter at the NIF

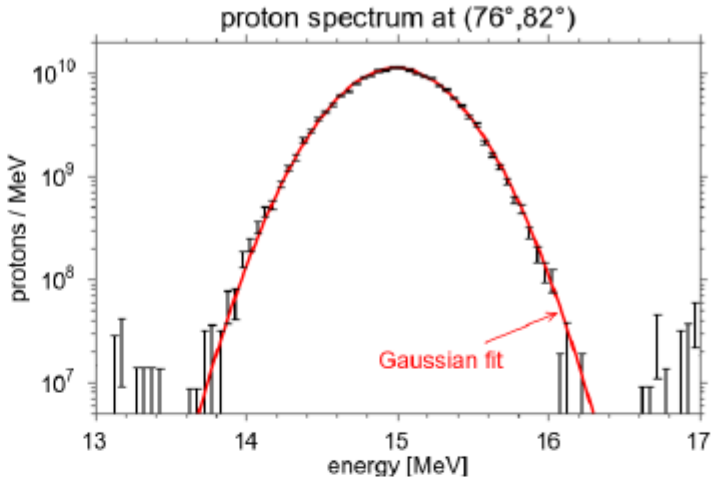


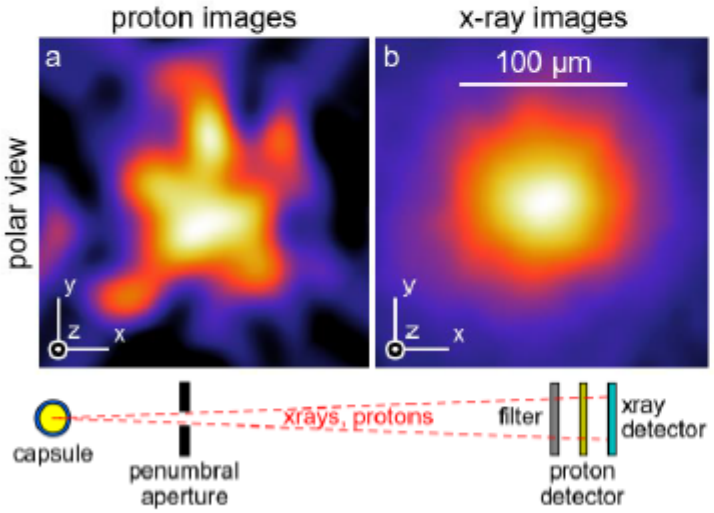


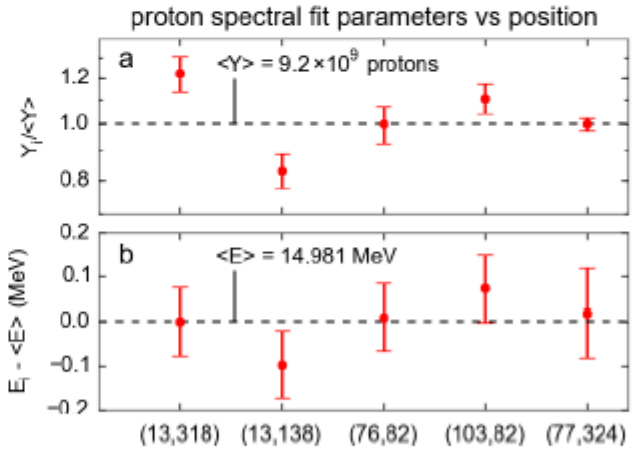
C.K. Li et al., Science (2010)

Recent NIF exploding-pusher implosions demonstrated the feasibility of a proton backlighter









In the coming months, we will investigate proton yield and source size as a function of various capsule and laser parameters

Development of a mono-energetic proton backlighter at the NIF

- This is a mature diagnostic technique that has been used extensively on OMEGA. Initial NIF shots with a D3He target have been completed.
- The collaboration between C.K. Li and LLNL (S. Le Page) to field NIF targets is in place
- This development needs to continue with NIF target development
- Can we replace CR-39