

Motivation

Why monitor beam loss?

- Assist with beam tuning
- Minimize activation, avoid beam damage, extend machine lifetime

Why simulate faults?

- Loss detection does not necessarily occur at fault location
- Must pinpoint source of beam loss in order to address the cause
- Try to correlate loss detection pattern with fault location

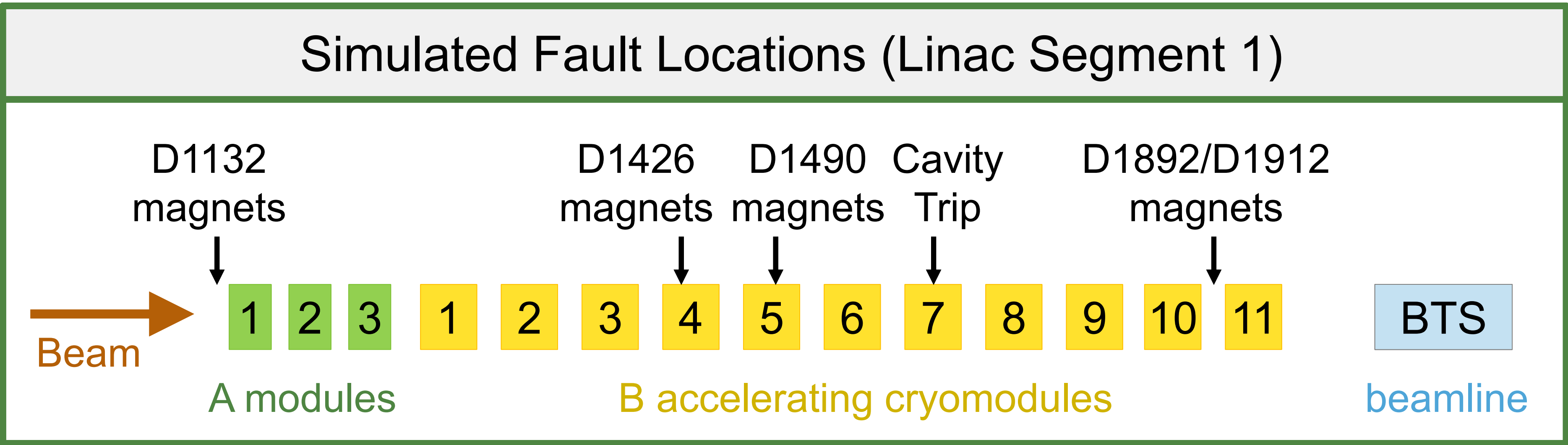
Sources of Loss

Faults / Mistuning

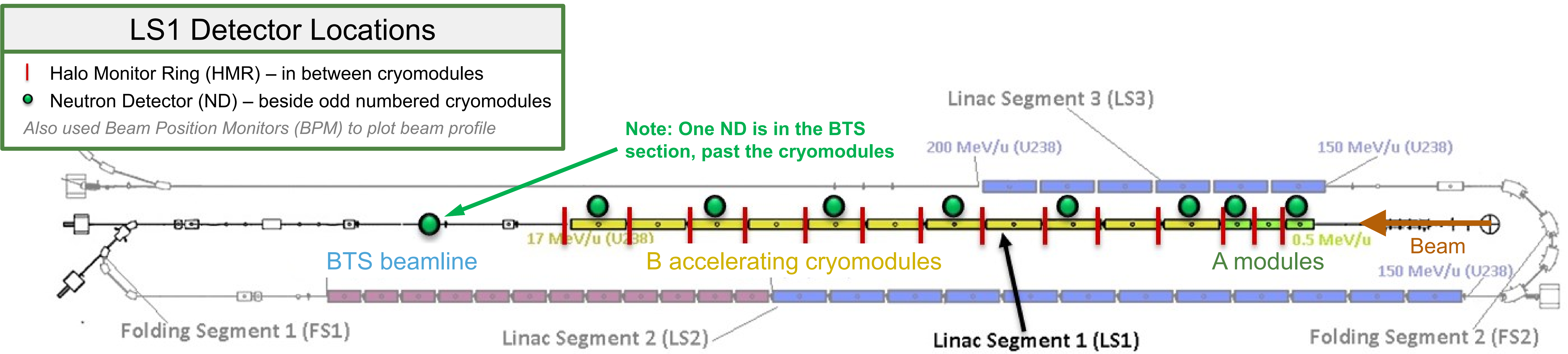
- Steering (corrector magnet current)
- Focusing (solenoid magnet current)
- Energy (accelerating cavity trip)

Intentional (*not studied*)

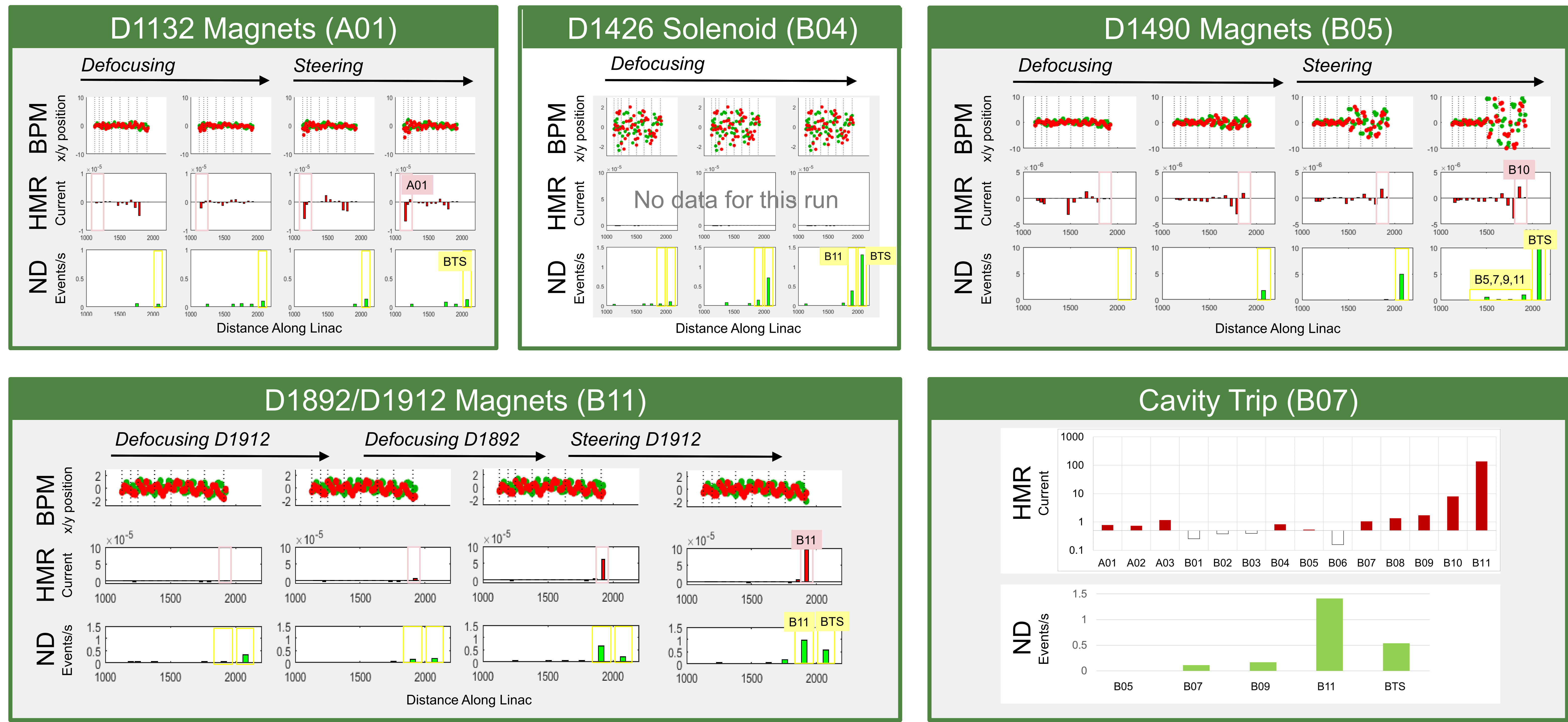
- Beam cleaning / Isotope selection
- Charge-state selection



Linac Layout



Results



Conclusions

Neutron Detectors

- Few losses seen in first half of LS1, energy too low?
- Small loss seen for defocusing (solenoid changes)
- Losses typically detected far downstream of fault location, especially for defocusing
- Cavity trip (energy change) loss detected starting with same module, and increasing downstream

Halo Monitor Rings

- Loss signal not much larger than intrinsic variation of readings
- Smaller signals early/mid segment compared to late segment
- Loss seen mostly in nearby HMRs
- Small loss from cavity trip (energy change) detected in nearby modules, but increases exponentially downstream