



Beam to NuMI

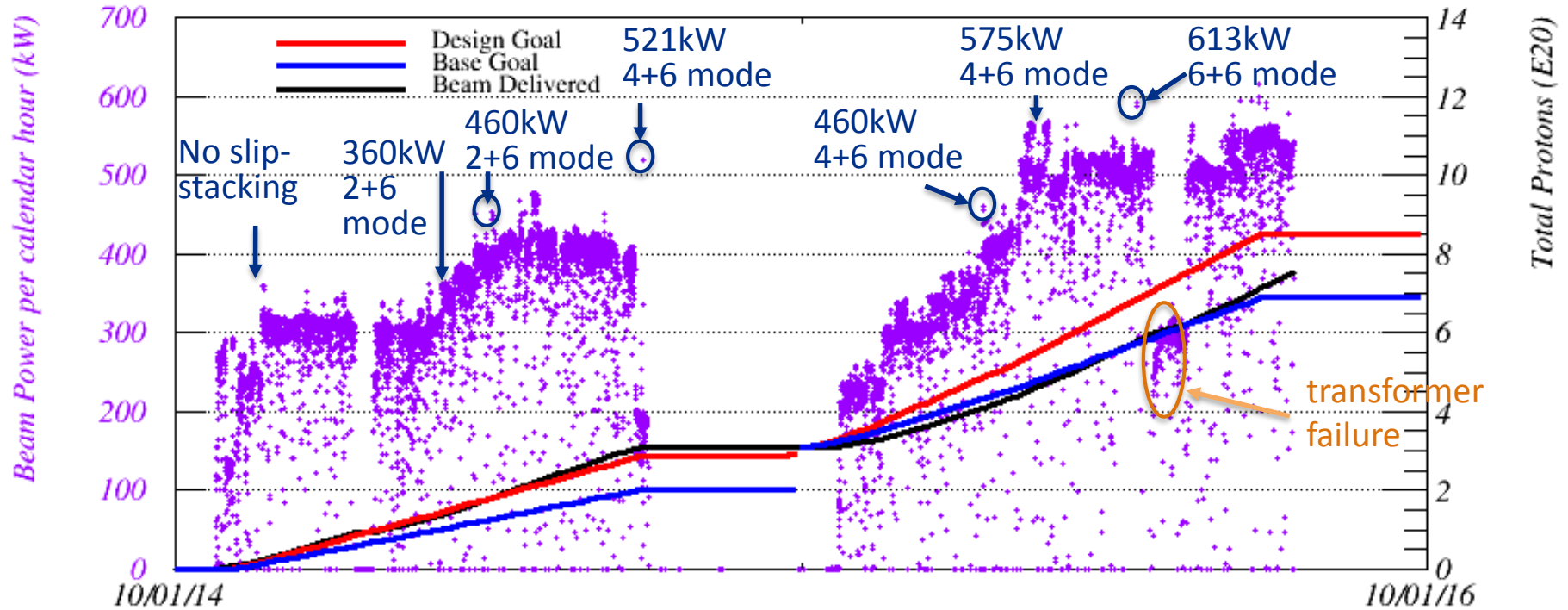
Mary Convery

MINERvA ORR

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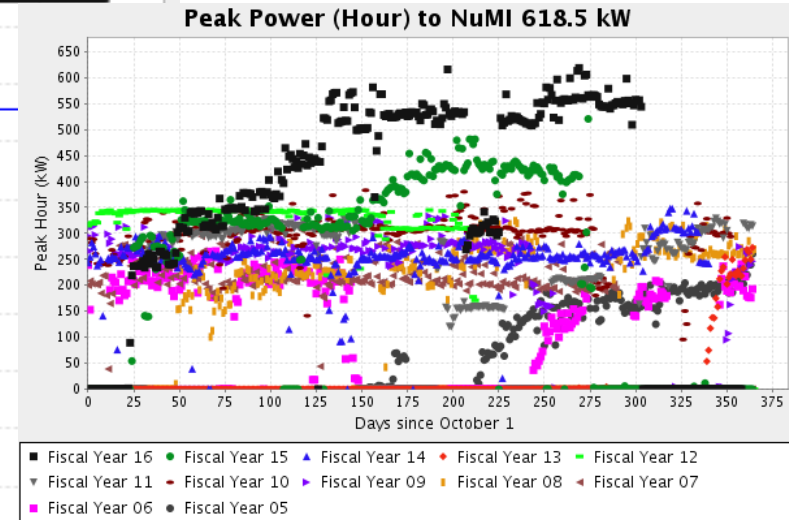
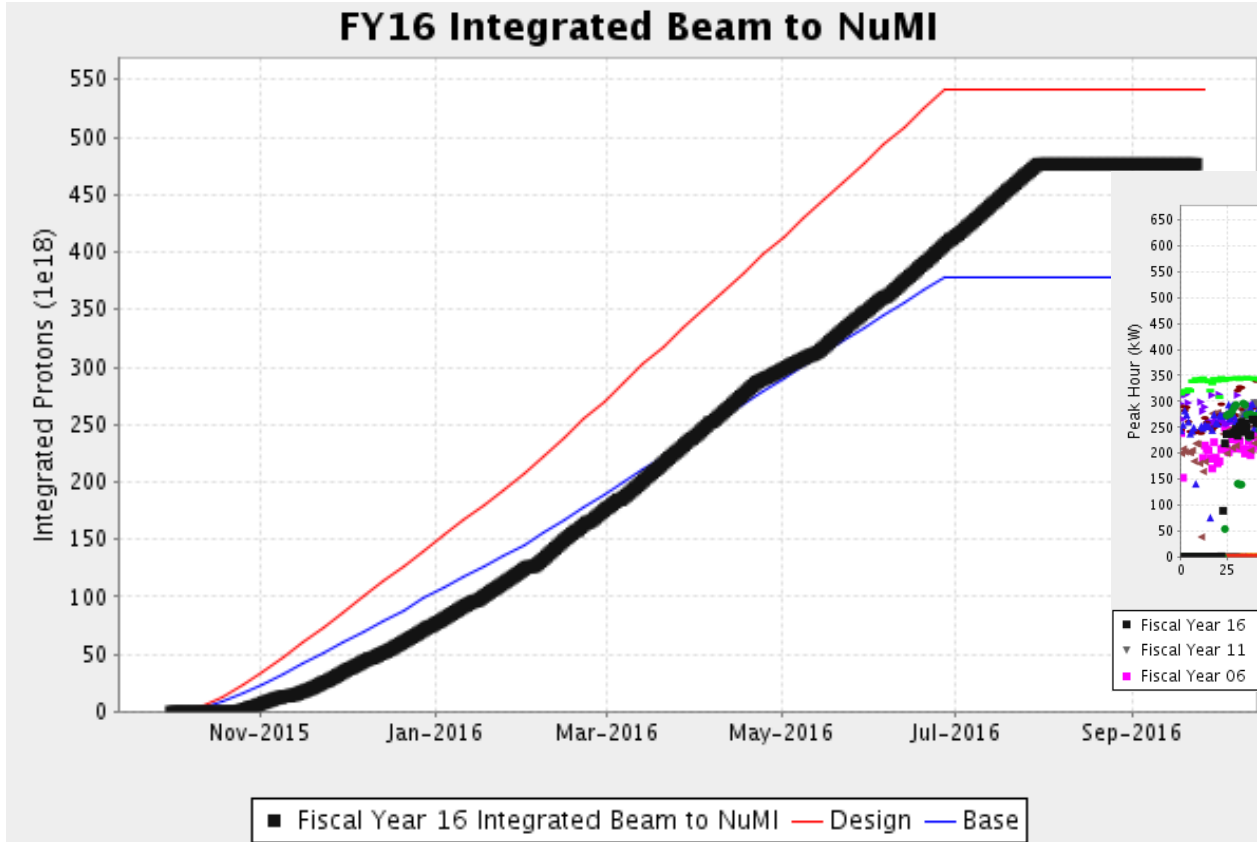
Ramping up Beam Power to 700 kW to NuMI

- (Note that SY120 takes 10% of timeline, 700 kW → 630 kW)



- Increased number of batches slip-stacked in Recycler in steps
- At each step, increased intensity while tuning for efficiency, losses
- Successfully demonstrated 700 kW for one cycle
- Regular 700 kW operation after this shutdown

Achieved FY16 Goals for Beam to NuMI



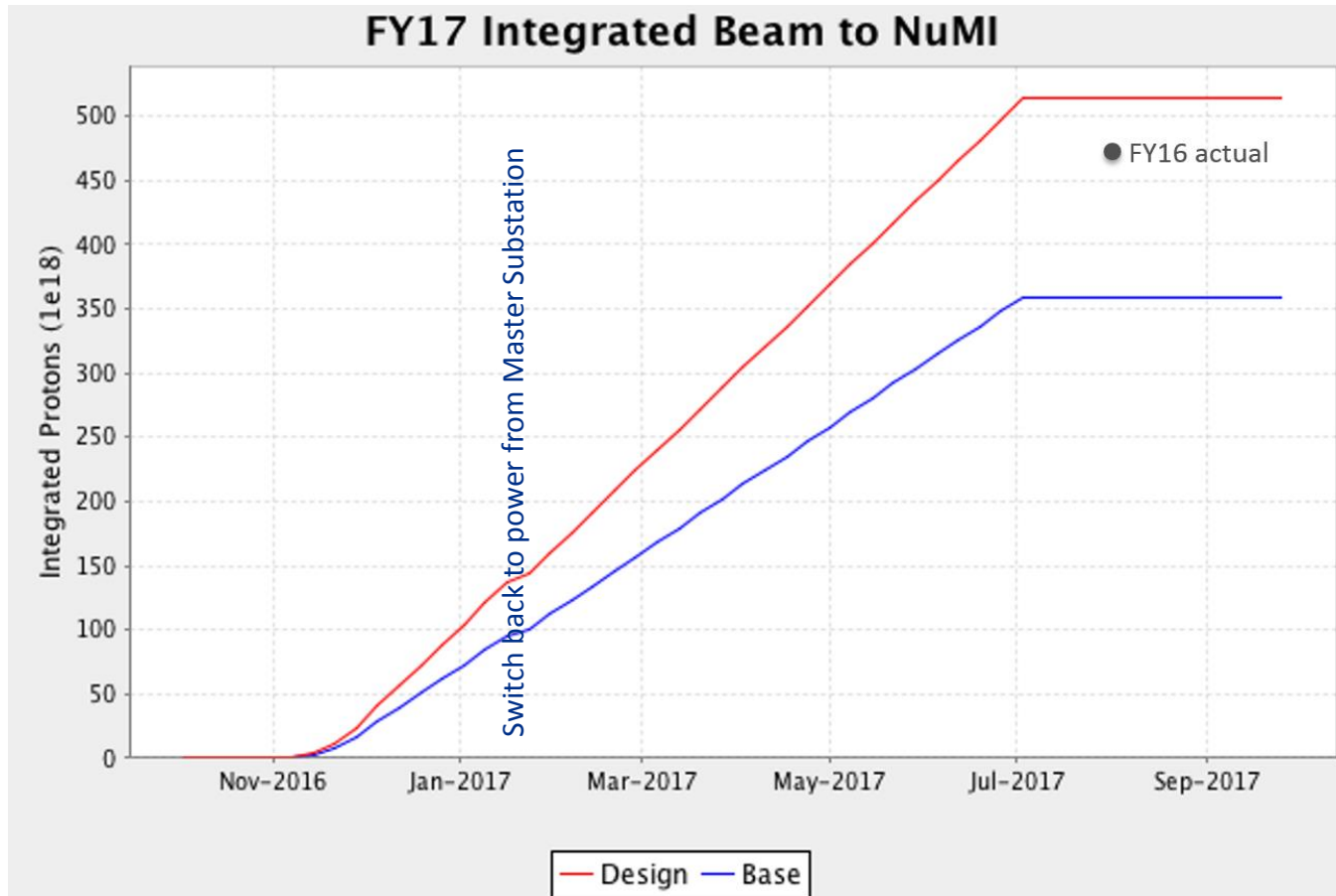
- Based on milestones for achieving 700 kW beam power
- Ran consistently at 550 kW (w/ SY120) prior to shutdown, make last ~10% push once collimators installed

Collimators Installed during Shutdown



FY17 Projected Beam to NuMI

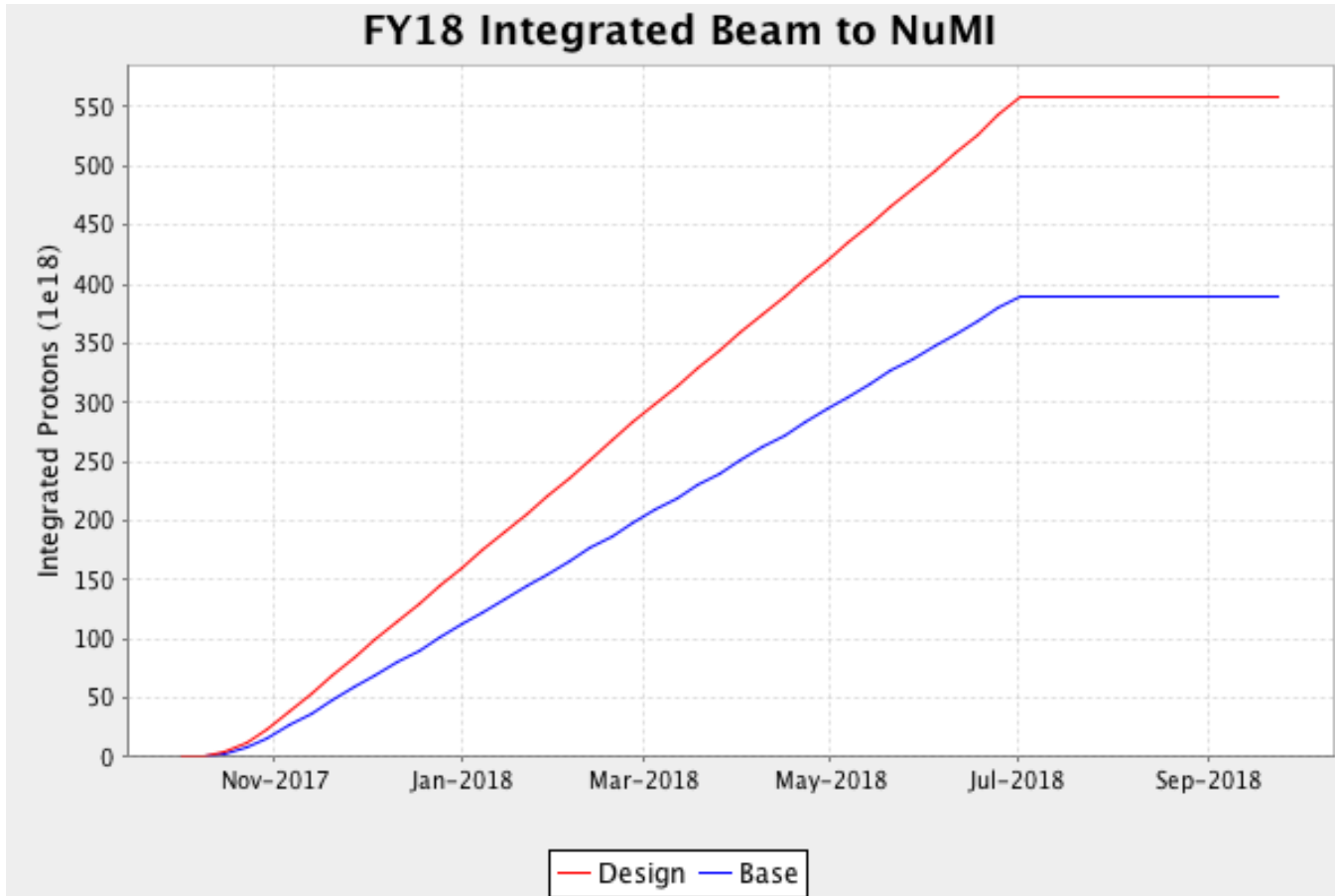
- Expect similar integrated beam to NuMI as FY16



- Can switch neutrino \leftrightarrow antineutrino modes in ~ 1 shift

FY18 Projected Beam to NuMI

- Longer run time (start up sooner) but 95% rate due to g-2 (cycle time goes from 1.33s to 1.4 s)



Beyond 700 kW

- In the longer term, beam power could be increased by
 - Increasing Booster batch intensity (increases losses)
 - Shortening MI ramp for ~1.2s cycle and going from 15 Hz to 20 Hz (requires new RF systems)
- We are looking into options for PIP-I+