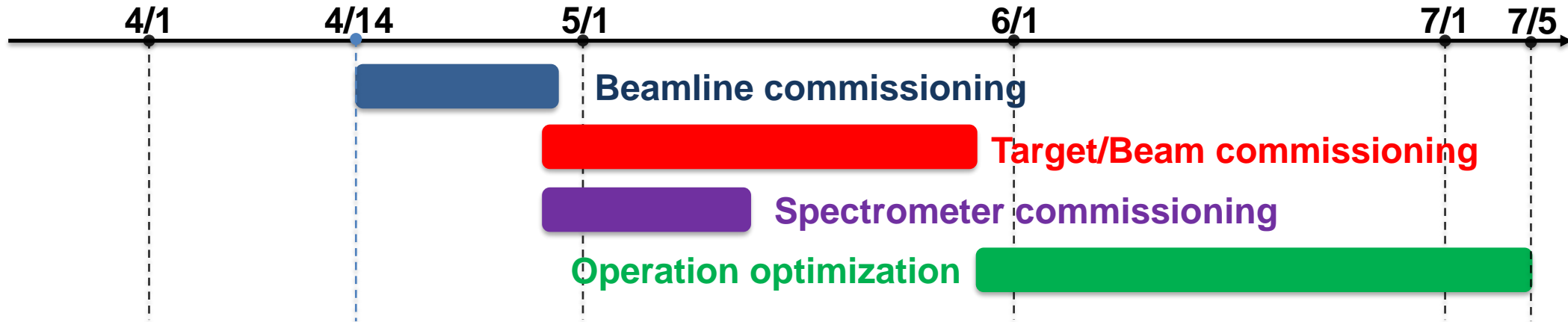
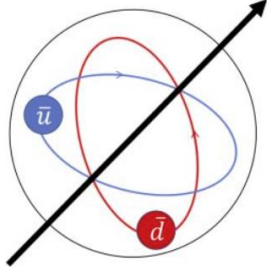


FY2021 Commissioning Plan

Kun Liu

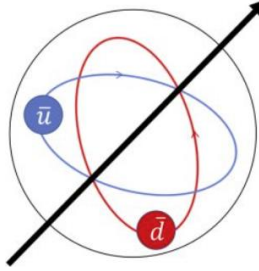
SpinQuest Review, 12/2/2020

Overview



- Goals of the commissioning
- Shifts and manpower

Beamline commissioning



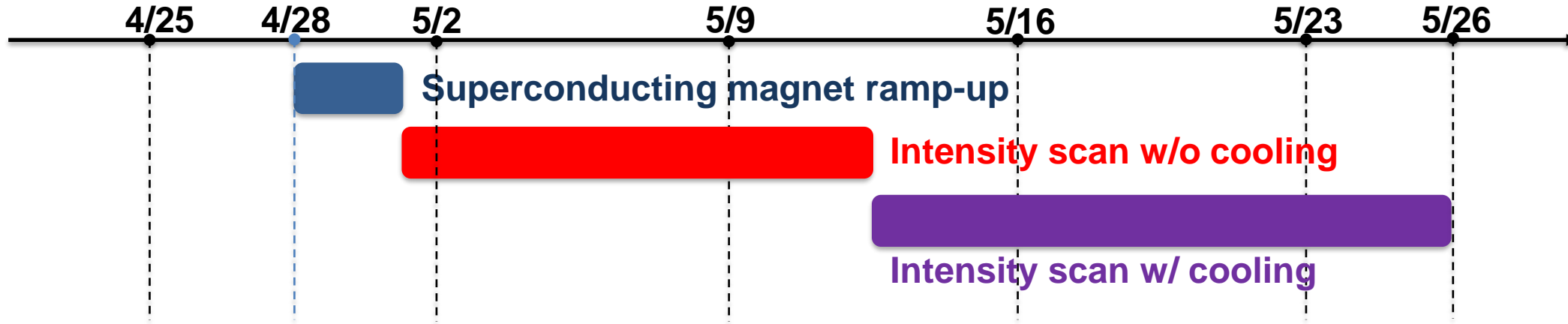
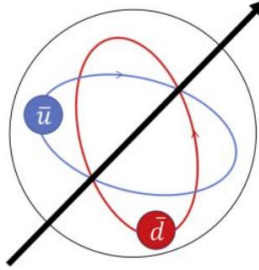
Commissioning Spinqest Beam

- Pre-beam
 - Inspect beamline enclosures and berm
 - Exercise power supplies, & LCW, vacuum, diagnostics checkout
- Low-intensity engineering run: 0.5×10^{11} /spill (no target)
 - Steer beam down NM, minimize losses, verify profiles
 - Steer and tune beam through shield collimator (picture) using
 - PWCs upstream and downstream (removable) of collimator
 - Minimize beam profiles using upstream quads
 - Bring secondary intensity up to 10^{13} per spill
 - Tune/measure target cave radiation (for SC coil protection)
- Experimental Run (target installed)
 - Start up with 0.5×10^{11} and coordinate with experiment



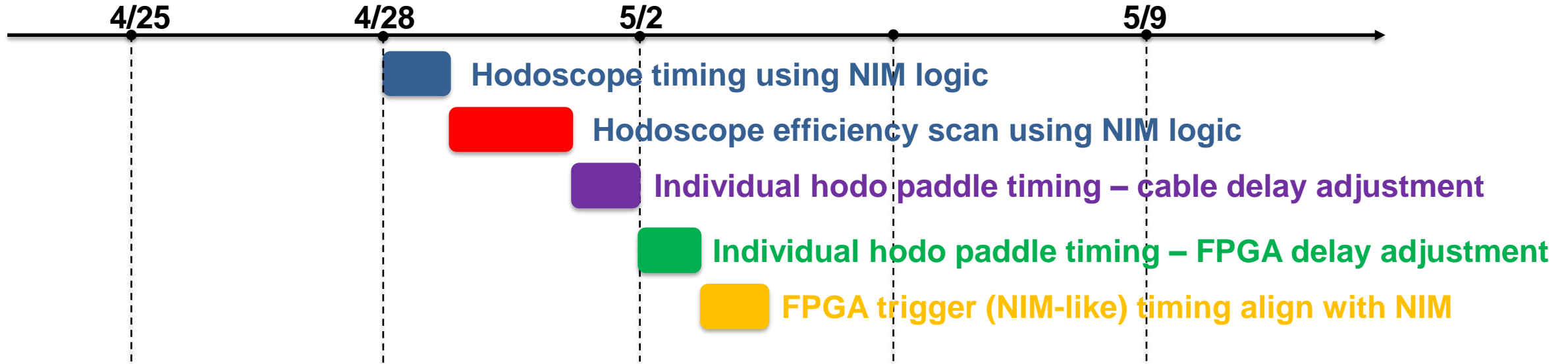
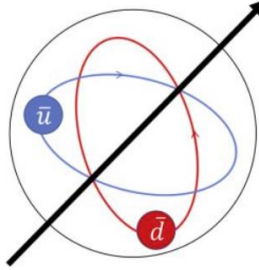
- Slide kindly provided by Carol Johnstone from FNAL AD
- We expect to request beam on 4/14
- Beamline tuning expected to take 2 weeks
- Opportunistic access to NM4 is possible, however we will leave it exclusively for beamline for the planning purposes

Target/Beam commissioning



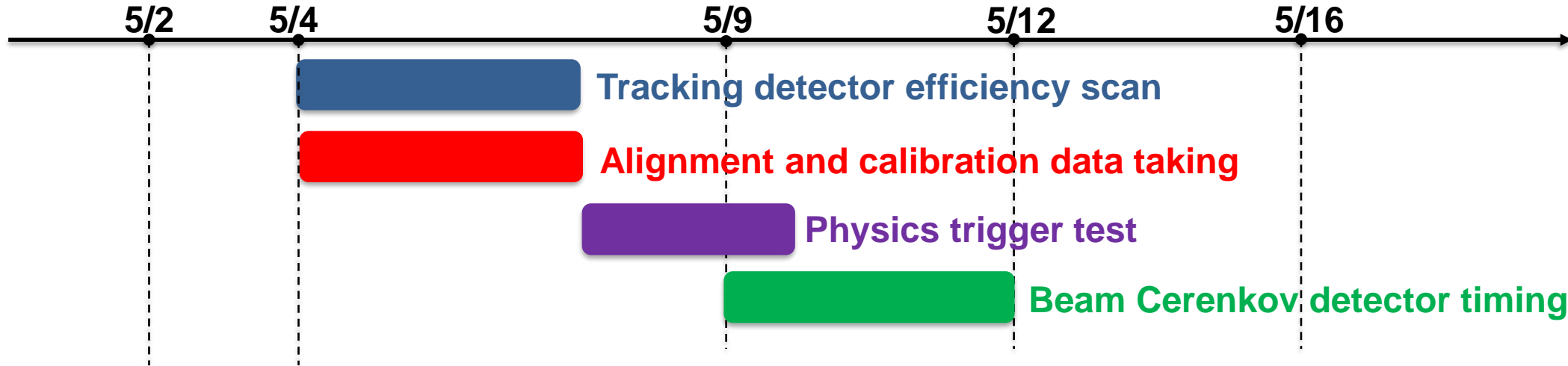
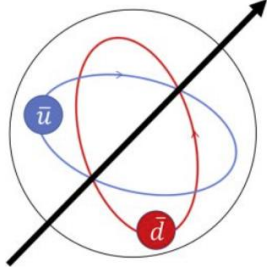
- Target commissioning with stable beam starts **4/28**
- Ramp up the superconducting magnet with minimal beam intensity (0.5×10^{11} /spill) **4/28 – 4/30**
- **Intensity scan w/o additional cooling/pumping 4/30 – 5/10**
- Intensity scan w/ additional cooling/pumping **5/10 – 5/26**
- Target commissioned **5/26**

Spectrometer commissioning Part 1



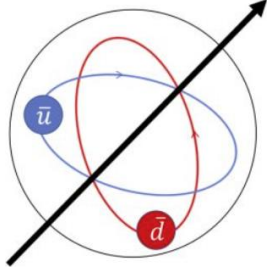
- Spectrometer commissioning starts on **4/28** in parallel with target/beam commissioning
- **Part 1** takes 6 days and focuses on timing in all trigger detectors and alignment of FPGA-based main trigger and NIM-based auxiliary trigger
- **Part 1** will have the FMAG ON and KMAG OFF, with either minimum beam intensity, or the beam intensity requested by the target group

Spectrometer commissioning Part 2



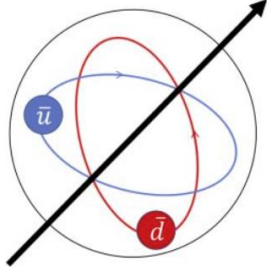
- Tracking detector (4 stations) efficiency scan, alignment and calibration **5/4 – 5/7**
- Starting 5/8, we will turn on both FMAG and KMAG, and take data with FPGA trigger based on the look-up table extracted from J/ψ MC **5/8 – 5/10**
- Beam Cerenkov detector (for accurate intensity measurement, and high intensity beam inhibit) timing adjustment **5/9 – 5/12**
- Spectrometer will operate with the default J/ψ trigger from **5/12**

Commissioning goals before 5/26



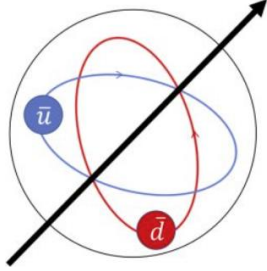
- **Beamline:** establish beam down to NM3 with the requested quality and profile
- **Target:**
 - Demonstrate the operation of the cryogenic system with proton beam
 - Measure the upper limit of the beam intensity under different cooling scenarios, and compare with the simulation results (3E12 – 10E12)
- **Spectrometer:** fully working spectrometer with J/ψ peak reconstructed from the target

Beyond 5/26

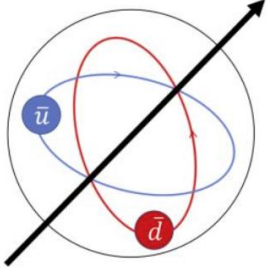


- The beam time between 5/26 and 7/5 is considered as the schedule contingency and the opportunity for our stretch goal
 - If the 4/14 beam start date is delayed, 5/24 will be the latest start date to ensure 6 weeks of commissioning to achieve the minimal goals
 - If minimal goals are achieved before 7/5, the remaining beam time will be used to start polarizing the NH_3 target and take data with the J/ψ trigger

Onsite experts



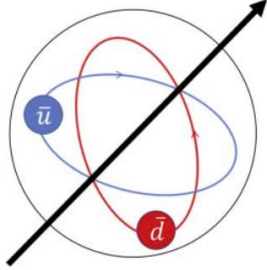
- Due to schedule uncertainties and COVID restrictions, we will rely on our onsite collaborators during the commissioning
- **Currently on the access list (19)**
 - General: Rick Tesarek
 - DAQ: Zongwei Zhang, Ching-Him Leung
 - Target: Dustin Keller, Anchit Arora, Ernesto Dias Fernandez, Zulkaida Akbar, Ishara Fernando
 - Hodoscopes: Forhad Hossain, Liliet Calero Diaz
 - Fiber Hodos: Cristina Mantilla Suarez
 - Prop. Tubes: Kun Liu, Zhaohuizi Ji
 - FPGA Trigger: Minjung Kim, Noah Wuerfel
 - Chambers: Kei Nagai, Nuwan Chaminda, Catherine Ayuso
 - Slow Control: Mikhail Yurov
- **Potentially available (3):** Paul Reimer (slow control), Abinash Pun (offline production), Kenichi Nakano (online monitor)



Shifts

- 132 days of shifts (3 8-hour shifts per day) needed – 636 shift-persons
 - ❑ 1-person shift during cryogenic (no-beam) commissioning: 2/23 – 4/14
 - ❑ 2-person shift during beam commissioning 4/14 – 7/5
- 22 (19) local collaborators – 30 (33) 8-hour shifts per person

Commissioning summary



- We present the plan for a 6-week commissioning starting **4/14** (no later than **5/24**) to achieve the following minimal goals
 - ❑ Fully commission the beamline and the spectrometer
 - ❑ **Understand the efficiency of the cryogenic system**
 - ❑ Measure the upper limit of beam intensity under different cooling scenarios
- Stretch goals
 - ❑ Understanding and optimization of the polarized target operation with the high intensity proton beam
 - ❑ **Preliminary TSSA measurement of J/ψ production**