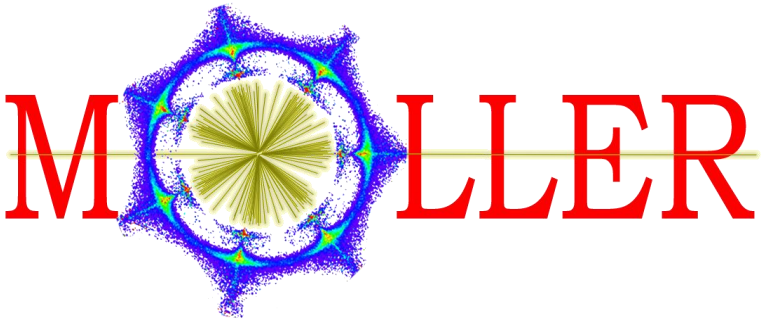
PQB Update

MOLLER Accelerator Tasks and Injector Upgrade



Riad Suleiman

MOLLER Collaboration Meeting
June 21-22, 2022

MOLLER Accelerator Tasks

1. Fast Helicity Reversal:
   - I. Ordered 6-8 new Helicity Generator Boards (to be ready by August)
   - II. MOLLER Settings: Free Clock Mode, 1920 Hz, 510.85 µs T_Stable,10 µs T_Settle, three 64-window patterns, 128-window delay.
   - III. Request was sent to Engineering Division (EESICS) – new boards will come with new firmware
   - IV. Ownership will be transferred from EESICS to Fast Electronics and DAQ Group

2. Helicity Decoder Boards:
   - I. Two protypes are under testing (UITF Mott and Hall B), 20 boards are on order
   - II. Re-visit firmware to ensure no possibility of real helicity decoding on board, only after event readout

3. Laser Table Jobs
   - I. New RTP HV Driver:
     - I. Continue to use RTP (spare: KD*P)
     - II. Build new RTP HV Driver: define effort between JLab & UVa (NSF funded) and implement Caryn's comments
   - II. Upgrade IA system
     - I. 4th channel for Hall D (need Hall D parity DAQ)
     - II. Reduce transition time <10 µs

MOLLER Accelerator Tasks … cont'd

4. Complete Injector Upgrade
   - I. Phase-I beam line installed last year (see Caryn's talk from June 2021 Collaboration Meeting)
   - II. Building new 200 kV gun (based on successful 350 kV gun) to eliminate FE
     - I. Tilted anode to eliminate vertical kick inside gun
     - II. Biased anode to prolong lifetime/keep QE uniform
   - III. Booster commissioning at UITF was successfully completed
   - IV. Phase-II Booster installation planned for next SAD (March-May 2023)
   - V. Afterwards, assessment of adiabatic damping and charge asymmetry for high current (less clipping, less x-y coupling)

5. Upgrade Helicity Magnets Control
   - I. MOLLER will use magnets to study sensitivities to position differences, position feedback (to suppress beam jitter), and check adiabatic damping
   - II. Request to upgrade was submitted to EESICS
   - III. Need to identify new owner from EESICS
   - IV. MOLLER to provide a requirement document by end of summer 2022 (include quadruple magnets for beam size?)

6. Feedback on Horizontal Polarization Orientation
   - I. Options considered: use H-Wien, new air-core short Wien in keV region, or new air-core long Wien in MeV region
   - II. MOLLER to provide a requirement document by end of summer 2022

MOLLER Accelerator Tasks … cont'd

7. Develop/Test 20 Amp low-noise trim for Wien magnets
   I. Wien magnets have too low inductance for 20 Amp SCE power supplies to regulate well
   II. DC Power Group to design/test 20 Amp low-noise trim card for 2023 March SAD

8. Halo monitors in Hall A and beam studies at 11 GeV
   I. On MOLLER collaboration to-do list

Need help from MOLLER to provide students and postdocs to support Injector activities and run parity DAQ