NEID 2021B Information Session

Sarah Logsdon (NEID Instrument Scientist)
Heidi Schweiker (NEID Queue Coordinator)
Mark Everett (NESSI Instrument Scientist/NEID Queue Development Team)
Jayadev Rajagopal (WIYN Executive Director)
Basic observational considerations @ WIYN

- **Elevation limit:** 15 deg (note: no requirement on NEID ADC performance below 19 deg)
- **“Cone of Avoidance:”** Cannot track a star within ~3 deg of zenith
- **Seeing:**

  ![Seeing histogram]

  Seeing measured with NEID from Dec ‘20- March ‘21

  - After-midnight median 0.94"
  - All-night median 1.02"
  - Before-midnight median 1.20"
NEID: The Basics

Waveband & Resolution: 380 – 930 nm, complete coverage, R ~ 120K in HR mode

Expected Precision: ~30 cm/s baseline goal (single measurement precision)

Commissioning and Shared Risk Science Happening Now:
- Operational Readiness Review planned for Spring 2021
- NEID fully available for Science in 2021B

Available to the Public via NN-EXPLORE and WIYN Partners through institutional time

Exposure Time Calculator:
Allows proposers to estimate exposure times, SNRs, and expected RV precision --
http://neid-etc.tuc.noao.edu/calc_shell/calculate_snr
NEID: Choosing a Spectral Resolution

- **High Resolution** or **HR** mode (R~120,000)
  - ~0.92'' fiber
  - Highest precision RVs on bright targets (V<12, e.g. TESS)
  - Allows for simultaneous calibrations
    - Specified at Phase 2
    - Requires OD filter selection to balance etalon and science light on the detector

- **High Efficiency** or **HE** mode (R~60,000)
  - ~1.5'' fiber
  - Faint targets (12<V<16)
  - Poor weather
  - No simultaneous calibrations

Credit: Roy et al. (2020)
NEID Calibrations

Standard Calibrations (not charged to PIs):

- Daily: Morning/afternoon cals -- darks, flats, wavelength calibrators (i.e. arc lamps, etalon, laser frequency comb)
- Every NEID night:
  - 1-3 RV standards (List at -- [https://www.wiyn.org/Instruments/wiynneid_observers.html](https://www.wiyn.org/Instruments/wiynneid_observers.html))
  - Subject to change based on final commissioning results:
    - 25 - minute intermediate cals near midnight
    - Bracketing etalons between each target
      - If you expect to need bracketing etalons, it should be noted in your proposal

Other calibrations are considered specialty calibrations and should be requested in your proposal (including spectrophotometric standards). They will be charged to your program.
Observing in Queue: How to choose observing priorities

P0 - Highly time sensitive observations
  • e.g. transits, R-M observations

P1 - Moderately time sensitive observations
  • e.g. quadrature, periastron, small number of observations evenly spaced in orbital phase; transits, R-M observations

P2 - Lowest priority for programs needing a high completion rate

P3 - Programs that can be executed during sub-optimal conditions
  • e.g. non-time sensitive observations, programs not needing a high completion rate

P4 - Programs that can be executed in poor conditions
  • e.g. bright targets needing single visits

Each partner receives a portion of time at each priority level:
  P0 = 8%, P1 = 17%, P2 = 25%, P3 = 25%, P4 = 50%
The NEID proposal process happens in phases.

**Phase 1:** Typical NOIRLab proposal process

**Phase 2:** For accepted programs -- PIs input target and observation details to the NEID web portal

**Phase 3:** (optional) PIs may change observing parameters or request new targets during the semester

*Note: The more technical information you can provide in Phase 1 (e.g. targets and specific timing windows) and Phase 2 (e.g. observing constraints and finding charts) the better.*
NEID: From Proposal to Reduced Spectra

• Proposals reviewed and allocated time by TACs early May
• WIYN schedule released mid-June; NEID Queue nights identified
• PI account setup on Queue Portal early July
  • Phase 2 information submitted by PI at least 10 days prior to observation
  • Targets and Observations approved by WIYN staff
• Observations scheduled via Queue Scheduler
• PI notified the next day if data was taken for their program
• Pipeline reduced data (Level 2) to be made available 24 hours after observations on the NEID Archive at NExScI
  (https://neid.ipac.caltech.edu/search.php)
NEID delivers fully reduced data

- Data will be fully reduced by the data reduction pipeline provided by the instrument team
- Every PI will have access to high-quality RVs produced by a common pipeline
- The archive will host three levels of reduced data for each observation:

  - **Level 0 - Raw data**
    - One FITS file for each exposure
    - Each instrument readout (16 total) in an HDU
    - HDUs for exposure meter, guider image and coherent fiber bundle

  - **Level 1 – Extracted Spectra**
    - 2D FITS images (order x pixel column) with extensions for sky, calibration, science fibers, and wavelength solution

  - **Level 2 – Radial Velocities**
    - Cross correlation function data
    - Sky and telluric models
    - Activity indicators
    - Additional keywords include
    - Barycentric correction
    - RV per order
    - Drift terms
Important Dates, Time Available in 21B

Semester 21B: 1 August 2021 - 31 January 2022
NOIRLab proposal deadline: 31 March 2021 at 11:59 pm (MST)
WIYN University partner proposal deadline: 15 April 2021 at 11:59 pm (MST)
Phase 2 information (full target/observation details): 10 days prior to expected observations

Time Available in 21B
- Approximately 30 nights for NOIRLab/NN-Explore time
  Includes all instruments (*NEID, NESSI, Hydra, WHIRC, IFUs*)
- University allocations are still TBD

*For questions, please e-mail: neid_info@noirlab.edu*