

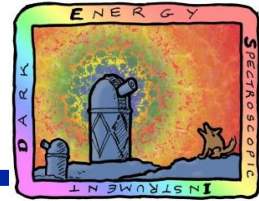


# Survey Simulations

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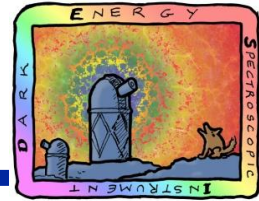
# Observing Overview



- **Long-term Strategy**
  - What is the order that we should observe the sky?
- **Afternoon Planning**
  - Design observations (LST, hour angle) for uniform coverage
  - Prioritize fields for night's observing
- **Field Selector**
  - Automated, real-time choice of observation field
- **Exposures**
  - Determine open-shutter time with real-time prediction of S/N from guider data
  - Immediate evaluation of spectral data (quicklook)
- **Simulations produce randomized weather patterns and perform simulated sequence of afternoon planning, field selection, and exposures for each night**



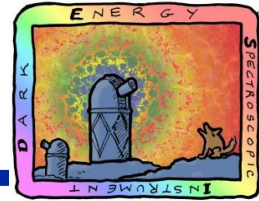
# Long Term Strategy



- **Strategy to complete 14k baseline program**
- **Dark Time: Define sequence of observations**
  - Observe complete 1400 sq deg area in two years for immediate clustering measurements
  - Observe LRG/QSO at highest priority for rest of footprint
  - Observe ELG after LRG/QSO are nearly completed
- **Grey Time: Increase efficiency and observe ELG targets**
  - ELG targets have features preferentially at red wavelengths, less susceptible to moon illumination
- **Bright Time: observe bright, low redshift galaxies**
- **Poor Conditions: observe very bright stellar fields**



# Afternoon Planning



- **Four modules**
- **Assign completion status to all fields**
  - Link to full reductions for completion status
- **Find optimal design of all incomplete fields**
  - Field centers (RA,DEC) for each field
  - Estimate of Galactic extinction
  - Determine Hour angles for each field
- **Identify fields for the night**
  - Are fiber assignments complete?
  - Moon avoidance, moon illumination
  - Moonrise, moonset
  - Sunrise, Sunset
- **Use long-term term strategy and contiguity arguments to prioritize fields for each timeslot during the night**



# Field Selector



- **Final module used by online system**
- **Simulate online system control of next-field selector**
  - Trigger next exposure request upon field completion
  - Choose next field based on LST and current conditions
- **Needs record of field information from fiber assignment**
  - Field centers (RA,DEC) for each field
  - Wavelength to optimize for each target
  - Estimate of Galactic extinction
  - Guide star positions and magnitudes
- **Needs record of observing strategy from afternoon planning**
  - Field prioritizations
  - Hour angles, predicted exposure time, and beginning LST
  - Conditional status of each field (dark, grey, bright, or poor)
- **Needs record of template target classes for each field**
  - For exposure time calculations



# Exposures



- **Three modules**
- **Simulate guide camera**
  - What is estimate of seeing, transparency, sky brightness?
  - Add noise to estimates to assess tolerance requirements
- **Simulate exposure time calculator**
  - Estimate exposure time for current field
  - Use guide camera information
  - Use template classes to determine integration depth
- **Exposure data**
  - Document true observing conditions
  - Document exposure times and properties
  - Simulate all metadata as required by pipeline group



# Simulations



- **Three modules**
- **Monte carlo weather over five year program**
  - Reproduce RMS, median conditions for each month as recorded in KPNO history
- **Wrapper on daily procedures**
  - Run afternoon planning
  - Produce weather conditions for night
- **Wrapper on observing sequence**
  - Repeat field selection, exposure sequence from dawn till dusk

