The Deep Underground Neutrino Experiment (DUNE) is a next-generation neutrino oscillation experiment.
- DUNE's primary physics goal is to measure charge parity (CP) violation in the neutrino sector.
- DUNE's near detector will be located at Fermilab, and its far detector will be located at the Sanford Underground Research Facility in South Dakota.
  - Far detector nominally consists of four 17.5 kt liquid argon time projection chamber (LArTPC) modules - some of the largest ever assembled.

An intense narrow beam of pure 266 nm (UV) light with a stable energy and profile is needed to ionize the LAr.
- Harmonic Splitting optics - purifies beam composition
- Attenuator - controls beam energy
- Apertures - truncates beam width
- Beam Sampler and Energy Meters - monitors laser energy

Stepper motors actuate rotary and linear stages in the periscope to provide detector volume coverage. Different stages enable three degrees of freedom.
- Interior Periscope has:
  - Rotation stage
  - Extension/retraction stage
- Exterior Periscope has dual rotary stages allowing:
  - Polar rotation
  - Horizontal translation
- Both Periscopes have:
  - Linear stage rotates mirror at end of periscope, allows for wide azimuthal coverage

The UV laser must be aligned with optical equipment in order to maintain a consistent beam profile and direction.
- Detector must remain sealed, alignment cannot be visually validated
- Camera is placed near viewport at the top of the periscope, aimed at the steerable mirror
- Will minimize reflections and deviations from alignment laser to align UV laser

Periscopes assembled and successfully tested in air at Los Alamos National Lab. Testing with class-IV laser beams and in LAr will start this month.
- 700-ton LArTPC prototypes at CERN (ProtoDUNEs), are used to validate technologies for DUNE.
- Periscopes will be installed in the ProtoDUNE Horizontal Drift Module for Phase 2 operations in August to test technical and physics performance.

LArTPC experiments, particularly surface detectors, can utilize cosmic ray muons in order to calibrate the detector. DUNE will be located ~1,500m underground.
- Another calibration source is required

DUNE Far Detector will utilize an ionization laser (IoLaser) calibration system in order to meet stringent systematic requirements.
- The IoLaser System will create tracks with known origin and direction in the TPC Volume

Two periscope designs, interior and exterior to detector field cage, will be installed in DUNE.
- Two systems allow for crossing laser tracks
- Overlapping coverage reduces uncertainty in reconstruction map
- Enables more accurate calibration