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MicroBooNe

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- 2.5m x 2.3m x 10.2m liquid Argon TPC
- 60t fiducial volume
- 2.5m drift length
- 3 wire planes 0 ±60°
- 3mm wire pitch
- Located on earth surface





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I.2 Space Charge in LAr



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- Ionization by cosmic muons (2.4×10-10 C/m3/s)
- Space charge build up by slowly drifting lons towards cathode



I.2 Space Charge in LAr



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Space charge alters E-field \rightarrow distorted detector map



2. UV Laser Calibration System



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- Use a well known ionization path to calibrate the E-field in the detector
- Path is introduced by precise steerable UV-laser





2. UV Laser Calibration System



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Integration of calibration system in Microboone



b U 2. UV Laser Calibration System UNIVERSITÄT BERN AEC ALBERT EINSTEIN CENTER FOR FUNDAMENTAL PHYSICS • Laser table assembly & Feedtrough Vertical actuator **Steerable Mirror** Vertical encoder UV Laser Path Aperture Attenuator **Steerable Mirror** UV-Laser Rotary encoder Alignment Laser Rotary feedtrough

2. UV Laser Calibration System



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• Full warm feedtrough test





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Test TPC Properties

- Size: 20cm x 20cm x 23cm active volume
- Channels: 2x32 (collection / induction)
- wire-pitch: 4mm
- E-field: 0.3kV/cm
- Cold Pre-Amps





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Cryostat Laser Feedtrough

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• Horizontal laser sweep



3. <u>Conclusion</u> & Outlook



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- Full setup tested in warm
 - Demonstrated positioning accuracy
 - Identified sensitive issues
- Steerable (shortened) laser feedtrough tested
 - Gained experience in operation and alignment of laser
 - Cold mirror steering and position encoding successfully tested
 - Fully automated scanning of TPC realized

3. Conclusion & <u>Outlook</u>



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- Full warm setup test in its final position
- Further test runs with the shortened feedtrough
- Calibration software development & testing
 - Finalize calibration software for MicroBooNE
 - Use data from test setup to test the software
- Final installation on MicroBooNE cryostat
- Integration of E-Field correction in MicroBooNE