ATLAS Liquid Argon Calorimeters Operation and Data Quality During the 2018 Run Including Demonstrator Data Taking

### Data Quality

- **Highest yearly data-taking efficiency for Run 2 with a data loss of 0.26% during proton data-taking** [3]
- **Main sources of data loss:**
  - **Coverage:** an area of > 512 cells is inactive due to a single hardware failure
  - **Noise bursts:** well-known noise phenomenon affecting a large fraction of the detector for a very short time (~1 μs)
  - **Noisy channels:** individual channels masked due to detection of electronic noise from pulses incompatible with liquid argon ionization
  - **Front-end cooling leak in EMB appeared in October but did not cause major data loss, and the system took good data throughout the year**

### Purity Stability Studies

- **Measured impurity in oxygen equivalent of the liquid argon** [4]
- **Measurements during collisions excluded due to signals from radiation in the ionization chambers**
- **Impurity of cryostats during Run 2 remained stable for the end-caps and decreased for the barrel**
  - Clear explanation for decrease in barrel not yet found, but change of other input parameters (e.g. temperature or high voltage of the ionization chambers) is excluded
- **Charge-up effects for most monitors after time periods without high voltage**

### In-Situ LAr Phase I Upgrade Demonstration

- **Upgrade of Level-1 trigger read-out system** [5]
  - To be installed during LS2 (2019-2020)
  - Uses super cells with higher granularity to cope with increase in instantaneous luminosity
  - Two demonstrator systems were installed
    - 1st generation: 2015-2017 (pre-prototype hardware)
    - 2nd generation: 2018 (pre-production hardware)
  - Successful data-taking throughout Run 2
  - Dedicated trigger items to select energy deposits within coverage

### Demonstrator Data Analysis Results

- **Various studies done using demonstrator calibration and collision data** [6]
  - Preliminary calibration shows good agreement with main read-out
  - Further studies: pulse shapes, event displays and more complex variables
  - Examples below show energy comparison and timing resolution including 200 ps beam spread

### References

4. ATLAS Collaboration, Liquid-Argon Calorimeter Plots on Detector Status, [https://twiki.cern.ch/twiki/bin/view/AtlasPublic/LArCaloPublicResultsDetStatus](https://twiki.cern.ch/twiki/bin/view/AtlasPublic/LArCaloPublicResultsDetStatus)
6. ATLAS Collaboration, Liquid-Argon Calorimeter Plots on Upgrade, [https://twiki.cern.ch/twiki/bin/view/AtlasPublic/LArCaloPublicResultsUpgrade](https://twiki.cern.ch/twiki/bin/view/AtlasPublic/LArCaloPublicResultsUpgrade)