- Motivation
  - Lithium wall conditioning improves plasma performance, in part, by enhancing deuterium retention.
  - Fundamental understanding of how lithium improves retention can be used to improve its application and applicability to other systems.
- Results
  - X-ray photoelectron spectroscopy immediately identifies oxygen as a prominent constituent.
    - Oxygen concentration in lithiated graphite increases from ~8% to ~20% over the course of 100 hours sitting in UHV (10^{-10} mbar).
    - Oxygen concentration increases to ~20% during a 1 minute deuterium ion irradiation (3.9×10^{15} cm^{-2}).
  - Connection to theory.
    - DFT simulations compare graphite matrices with and without oxygen and lithium, and reveal that deuterium preferentially binds with oxygen instead of lithium.
    - Simulations suggest that greater retention occurs with high amounts of oxygen (~20%) and no lithium.
  - In experiments, oxygen was implanted in graphite to achieved ~20% surface concentration. Subsequent deuterium implantation released all of the implanted oxygen, thus precluding enhanced retention.

- Conclusions
  - Oxygen-deuterium binding is the primary mechanism for enhanced deuterium retention in lithiated graphite.
  - Lithium plays an indispensible role of gettering and retaining oxygen.
- Future work
  - As oxygen plays a critical role in retaining deuterium, determine the relative contribution of potential oxygen sources: 1) ambience, 2) substrate, 3) lithium deposit.

- Useful PPPL contributions
  - Provide the RGA data from a 'typical' run. How does the oxygen behave during lithium evaporation? During shot?