# Packing Fraction Measurement

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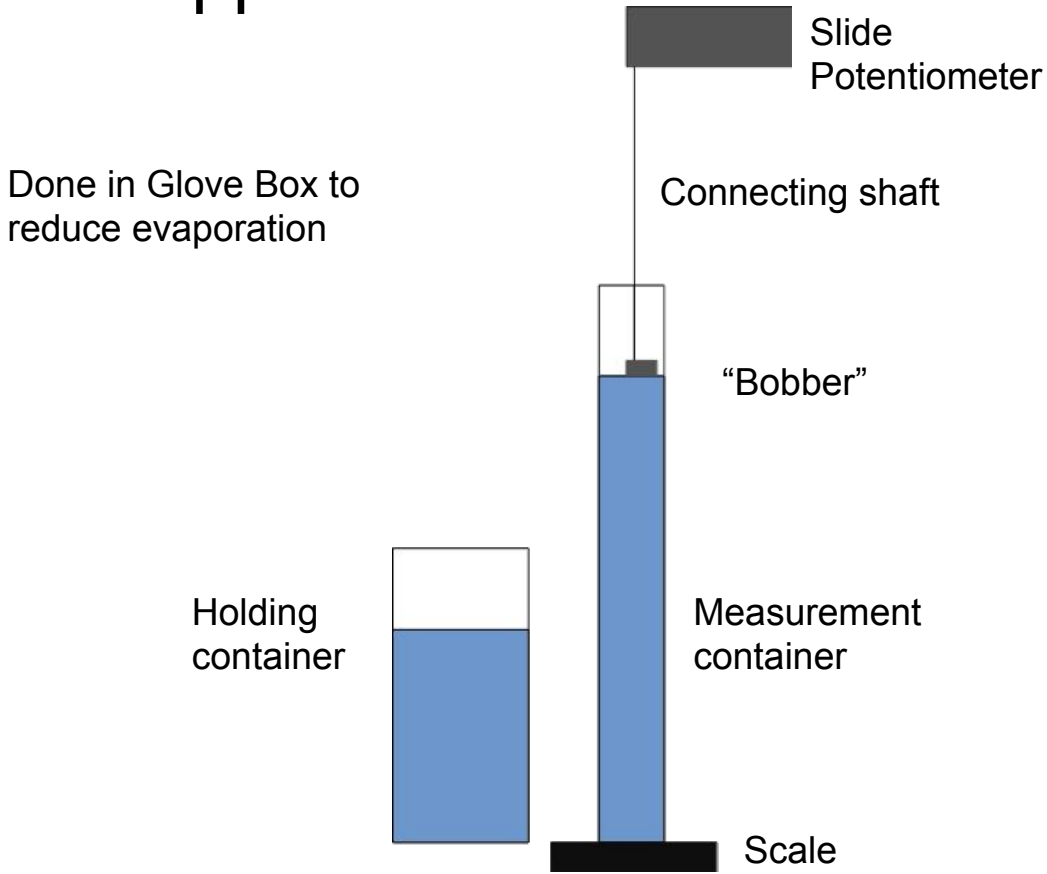
# Goal and Challenges

- Goals:
  - Measure mass and volume of Ammonia in target cups
  - Use packing fraction in $LN_2$ to extrapolate packing fraction in LHe
- Challenges:
  - Little data on density of Ammonia at low temperatures
  - Evaporation of $LN_2$ during measurement
  - Precise measurement of displacement
  - Precise measurement of mass

# Proposed Apparatus



# Steps necessary

1. Calibrate position measurements to volume measurements in measurement container (do with water)
2. Establish evaporation rate of LN2 in measurement container (used for mass and volume measurements)
3. Using plastic beads, measure density using both water and LN2 to confirm method
4. Measure mass and volume of target cup in LN2

# Procedure

1. Put target cup in holding container to thermalize and reduce boiling during measurement
2. Measure level of LN2 in measurement container, mass of measurement container and LN2, and start clock
3. Place target in measurement container and measure level of LN2 and mass of container
4. Using elapsed time and evaporation rate, use level and mass measurements to find volume and mass of target cup.

# To Do:

- Make a prototype as proof of concept
- New scale?
- Undergrad for the summer?