Background

* Good DSD (droplet size distribution) in-situ measurements are essential
  + Provide insight into many precipitation processes/process interactions
  + Simulated distributions are core of binned microphysical cloud models
  + Probably add another main point

Motivation

* Forward scattering and linear array probes are used extensively but have drawbacks
  + Instrument response is often highly theoretical
    - Major uncertainty due to…
      * Sample volume uncertainty
      * Inhomogeneous response
  + Complications can seriously decrease retrieval confidence/useful instrument operational ranges
    - Include references to CDP/FSSP uncertainty values
* Typical calibration methods are lacking
  + Use glass beads or polylatex spheres
    - Have different optical properties (vs. water)
    - Subject to clumping/misshapenness
  + Large spacial/concentration/velocity/diameter uncertainty – good enough for field/diagnostic work but can’t get at specific questions

Objectives

* Develop laboratory optical probe calibration device which uses water drops vs. glass/poly
  + Better representation of instrument response (no refraction complications)
  + Greater precision for detailed investigations
    - Sub-micron spacial

Generator Assembly

* Pezio-electric print head ejects into flow
* Flow accelerates drop out of tube, through probe sample volume
* Can alter drop diameter/velocity with printhead Z placement

System Design

* Major components
  + Printhead actuated by jetdrive
  + Fed from pressure regulated reservoir
  + X/Y stage for sample area placement
  + Metrology camera verifies droplet diameter/velocity
* Minor components
  + Filters
  + Ionizer
  + Orifice

Remaining Work

* Add micro stages
* Collect CDP dataset