Remote sensing of cloud properties using PACE SPEXone and HARP-2

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Goals:

- Deliver implementable algorithms for products in the table on right
- Use simulated measurements based on Large Eddy Simulations and 1D/3D radiative transfer to study:
  - Uncertainties from collocating to surface instead of cloud top
  - Uncertainties from cloud inhomogeneity within polarimeters' FOV
  - Multi-angle cloud optical thickness as indicator of cloud inhomogeneity
  - Information content about cloud top height, physical thickness and cloud fraction in SPEXone O_2 A band and UV data
- Map out where/when required scattering angles are sampled
- Develop "flexible" algorithms: test on/apply to RSP, airHARP, SPEXairborne, POLDER, CubesatHARP, 3MI, future (A&CCP) polarimeters

√: readily implementable
√: experimental

Parameter	HARP-2	SPEXone
Droplet effective radius and variance	✓	✓
Droplet size distribution	✓	✓
Cloud top phase	✓	
Ice shape and asymmetry parameter	✓	✓
Cloud optical thickness	✓	✓
Cloud top height		✓ √
Cloud fraction		✓
Cloud physical thickness		✓