Radio polarimetry is an important tool that can be used to study the magneto-ionic medium surrounding radio-emitting plasma. High angular resolution is essential for overcoming the effects of beam depolarization, whereby polarization vectors of different angle and amplitude are averaged together within a beam. With the VLA, science on arcsecond scales is achievable, but ngVLA will be needed to probe subarcsecond scales (corresponding to tens to hundreds of pc at z=0.1 to >1) over a wide enough range of frequencies to disentangle Faraday-complex scenarios (beyond a simple foreground screen of plasma) that will occur in jet-cloud interactions.

At very high (milliarcsecond) resolutions, VLBI can study the polarization properties of the bright inner regions of jets, and test scenarios for jet formation that invoke a hot thermal wind to confine the jet in its early stages, and also constrain inflow into the black hole (e.g. for M87; Park+19). Combining the VLBA with ngVLA will allow these studies to be expanded beyond the most nearby black holes.

**Example science:** Minkowski’s Object, a jet-galaxy interaction at z=0.0189. The radio jet is impacting a dwarf galaxy and inducing star formation (Croft+06; Lacy+17; Fragile+17). With ngVLA, this interaction could be studied at scales smaller than the CO clumps (~1”; 500 pc).

**Models suggest that Faraday rotation can arise from thermal winds, inflowing material, or thermal matter mixed with the jet plasma. Park+19 show that, at least in M87, mixing is negligible and the Faraday rotation most likely arises from a mis-aligned wind (which is also helping to collimate the jet).**

**References:**