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Status and future plans for the South Pole Observatory (SPO)

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The South Pole Observatory (SPO) brings together the BICEP and SPT collaborations with the goal of providing state-of-the-art constraints on inflationary gravitational waves. The BICEP program has a long history of setting constraints on the tensor-to-scalar ratio r , including the current leading constraint $\sigma(r) = 0.009$ (PRL, 2021). Future results will benefit from the increased sensitivity of the BICEP Array (which began deployment in 2020), as well as combining data with the South Pole Telescope (SPT) for delensing. Current forecasts predict that this combined effort will reach $\sigma(r) \sim 0.004$ with already acquired data, and $\sigma(r) \sim 0.001$ by the 2034 observing season. In this talk, I will present recent and planned upgrades to BICEP Array and SPT, as well as outline joint analysis effort to achieve high-fidelity lensing reconstruction and delensing.

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