Atomic and solid-state cavity QED with fiber Fabry-Perot cavities

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High-finesse optical cavities are an enabling tool for spin squeezing, quantum networks, quantum optomechanics, and many other applications where light-matter interaction is controlled on the quantum level. I will discuss two experiments that are enabled by a fiber-based optical cavity that we have developed. In the first experiment, the cavity is used to generate and tomographize entangled states in a mesoscopic atomic ensemble. The second experiment demonstrates strong coupling between the fiber cavity mode and polaritons in a semiconductor quantum well.