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Doing more with Fabry-Perot resonators: low-loss intracavity optics and real-time dynamics LAVANYA TANEJA, MARK STONE, AZIZA SULEYMANZADE, JONATHAN SIMON, University of Chicago — Recent developments have shown that Fabry-Perot resonators are a powerful tool for manipulating and characterizing light, and present unique opportunities to tailor the dispersion of strongly interacting photons when combined with Rydberg EIT. To extend these exciting possibilities, we are exploring the limits of optical resonators, demonstrating that intracavity lenses and electro-optic crystals can be incorporated without significantly impacting the resonator finesse ($> 10^3$). Introduction of lenses opens avenues for aberration-compensation and stronger light-matter coupling, while electro-optics present possibilities to explore Floquet physics with optical photons. We also employ the intracavity electro-optic modulator to achieve MHz-bandwidth resonator locking. Finally, we demonstrate space-time-resolved measurement of the transverse motional dynamics of intracavity photons, paving the way for exploring curved space dynamics of photons on multiply connected surfaces.

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