

Application driven challenges for Rydberg atom electrometry

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We describe methods for eliminating residual Doppler shifts and engineering vapor cells for specific applications in Rydberg atom-based electrometry. We have shown that a 3-photon co-linear scheme is able to reduce residual Doppler shifts to the order of magnitude of the Rydberg state decay times. Recently, we have carried out experiments using the approach and shown that sub-residual Doppler shift spectral line shapes can be obtained. We demonstrate spectral bandwidths of 500 kHz using the cesium 42 P_{3/2} Rydberg state. We have also developed several types of novel vapor cells for Rydberg atom-based electrometry for applications in metrology. We discuss and describe our analysis of one of these vapor cells.