

Three-photon detection and readout for Rydberg atom-based RF field sensors

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We will present new measurements and theoretical analysis of three-photon, Doppler free, all-optical, atom-based electric field sensors. Atom-based radio frequency field sensors have a number of applications in communications, radar and test and measurement. We will describe the nature of how these coherent sensors work by presenting analytic expressions for phase and amplitude detection, including transient behavior. Our latest sensitivity, linewidth and phase detection experiments will be presented. Vapor cell engineering of the sensors will also be addressed, including design goals and efforts to mitigate effects such as electric fields in MEMs type vapor cells.

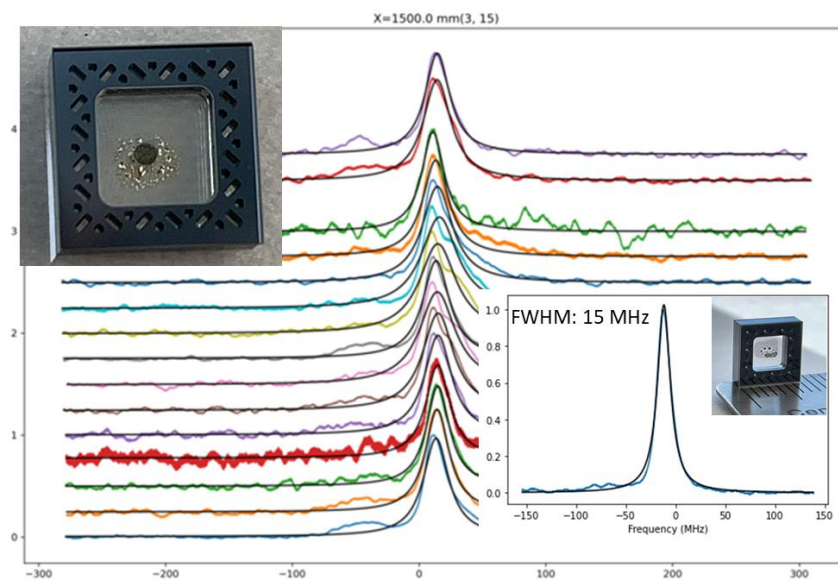


Figure 1. Vapor cells designed for RF electric field sensing. The figure shows the linewidth reproducibility of the vapor cells.