Distorsion of a radiofrequency field by a Rydberg atom cell

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The large dipole moment of transitions between two highly excited Rydberg states can be used to detect radiofrequency (RF) fields, through changes in the Electromagnetically Induced Transparency (EIT) involving one of these Rydberg state [1]. An advantage of such a scheme is its dielectric nature that should much less distort the field than usual metallic antennas. However, the cell is not completely transparent to RF fields [2], which thus even exhibit inhomogeneities due to reflexions on the windows. We propose to characterize the cell effect on the RF field using simulations and measurements obtained with the EIT set-up.

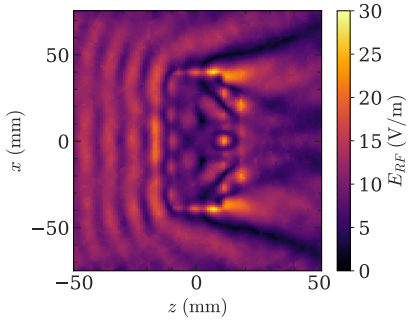

Figure 1. Electric field amplitude distribution in presence of the vapor cell, obtained by the HFSS software.

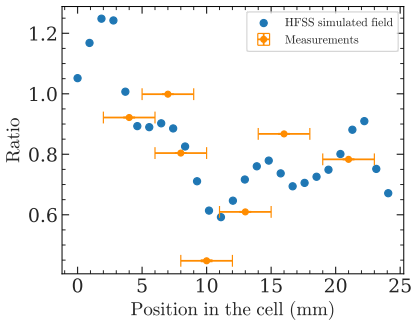

Figure 2. Ratios between the RF electric field amplitude with and without the cell for both measurements and simulations.

Acknowlegments

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References

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