We have excited helium atoms from their metastable \( 2S_\text{m} \) state to the Rydberg states in the range \( -13 < n \approx -50 \) in a two step process via the \( 3P \) state using lasers at 396 nm and 798-815 nm. The interaction region is between two metal plates where electric field can be supplied to enable Stark tuning, or even induce field ionization. Ions from Rydberg atoms are observed experimentally when no other field or laser applied to them. Based on evidence we have we attribute this ion signal from black body radiation induced ionization of the Rydberg atoms we experimentally produced. By heating the plates we observe the expected other field or laser applied to them. Based on evidence we have we attribute this field ionization. Ions from Rydberg atoms are observed experimentally when no plates where electric field can be supplied to enable Stark tuning, or even induce lasers at 398 nm and 798-815 nm. The interaction region is between two metal another project.

**Experimental setup**

By either scanning the ir laser frequency or the electric field between the plates, when the energy conservation relation is satisfied, an ion signal is observed. For those double dots near a single theoretical line!

**Detection of ionized Rydberg Atoms**

An interesting result arose when we move the lasers excitation region upstream further away from the ion detector and measure the decrease of the ion signal strength. The data is presented in the next graph and we find out that the exponential fits well. After we convert the distance into time by the velocity of the metastable helium atoms we can get the decay lifetimes. We found 16(1) and 34(1) for the 24S and 30S states respectively which are ~10-100 times weaker than the ion signals induced from field ionization!

**Conclusion**

BBR induced ionization on helium Rydberg atoms has been studied in details. It has been demonstrated that BBR ionization mechanism can be important and also a useful tool, quite a contrary to its noise role in many other experiments.

**References**


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