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Effect of finite size cavity on nS Rubidium Rydberg state lifetimes[1] BARBARA MAGNANI, CRISTIAN MOJICA-CASIQUE, LUIS MARCASSA, Sao Carlos Institute of Physics at the University of Sao Paulo — In this work, we present lifetime measurements of nS states of Rb as a function of the principal quantum number ($40 \leq$ n ≤ 70) using a sample of cold atoms held in a magneto-optical trap, which is performed in a finite size metal vacuum chamber. The Rydberg states are excited through a two-photon transition, and detected by pulsed field ionization. Our measurements are larger than the predictions by well established theoretical model. We have implemented a theoretical model, which considers the vacuum chamber as a lossy Fabry-Perot cavity with a discrete spectrum, and compared with experimental results. Such comparison indicates that the blackbody radiation contribution on Rydberg state lifetime can be decreased by using a small size metal cavity, without the need of cryogenic environment. This effect may have application in experiments where longer Rydberg lifetimes are required.

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