

13 – 15 de jul. de 2022

Perimeter Institute for Theoretical Physics

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## Observation of linewidth narrowing in EIT polarization spectroscopy involving hot Rydberg atoms with Laguerre Gaussian modes

14 de jul. de 2022 14:00

20m

Theatre (Perimeter Institute for Theoretical Physics)

### Palestrante

Luis Marcassa (University of Sao P...)

### Descrição

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In this work, we investigate the narrowing of the electromagnetically induced transparency (EIT) profile in a three-level ladder of rubidium atoms at room temperature using a Rydberg state and a Laguerre-Gaussian mode laser. The Gaussian probe field couples the  $5S1/2 \rightarrow 5P3/2$  states. The control field, which can be in either Gaussian or Laguerre-Gaussian (LG) modes, couples the  $5P3/2 \rightarrow 44D$  state. The EIT spectrum is measured with the polarization spectroscopy (PS) technique, resulting in a dispersive signal. The dispersive PS EIT linewidth is 20% narrower for the LG mode than for a Gaussian mode, due to the donut spatial distribution of the LG mode used. We have implemented a probe transmission model using a simplified Lindblad master equation, which allows us to calculate the PS signal and reproduces well the experimental results. The use of the PS signal eliminates the need to fit a curve when measuring EIT linewidths while still providing subnatural widths. Narrowing the transmission profile is of great interest to measure effects such as atomic collisions and microwave fields.

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### Materiais de apresentação

Ainda não há materiais

### Referências externas

22070009 48f99c2d-3623-46a3-8d40-100d13fd40ca 76365cbe-4ead-4c0d-bd49-bec8324924fb