Rydberg-based quantum sensors and quantum gates using atomic vapors

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I will first give an overview of Rydberg-state atom, EIT, and quantum-state manipulation. Rydberg atom has a large polarizability so that Rydberg-EIT spectrum is sensitive to electromagnetic fields, covering the range of MHz to THz. I will present the rich structure of Rydberg EIT spectrum under certain magnetic fields and will explain its application on the quantum electrometry as well as the THz image sensing. With Rydberg atoms in miniaturized devices such as optical waveguides, we aim to generate multiple quantum-bits and quantum gates due to the strong atom-atom interaction.