The fun with optical resonators of macro- and micro- sizes on spectroscopic applications

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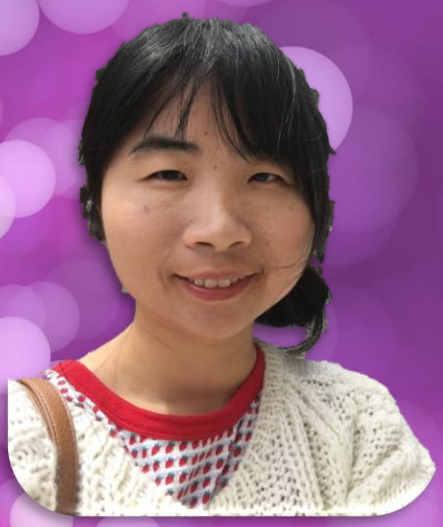

Laser spectroscopy is a powerful tool for revealing the fine structures of atoms and molecules, which help us to understand how the science works at its fundamental level as well as increase real-world applications. To uncover the physical or chemical properties with high resolution or at a few particle levels, an optical cavity is a straightforward way to amplify the light-matter interaction. However, experimental limitations, such as light-cavity coupling or intrinsic molecular properties, have restricted the availability of cavity-enhanced spectroscopy. In this talk, I will describe our efforts to push cavity-enhanced spectrometers to surpass these limits.

In the first part, I will describe the use of a chip-scale optical frequency comb as a broadband laser for the cavity-enhanced spectroscopy of real-time gas sensing. In the second part, I will describe my work in chiral microcavities. Because of the reciprocal properties of molecular chirality, achieving chiral control in a cavity has been a challenge. By taking the advantage of the newly developed non-reciprocal chiral organic thin film, the chirality is able to be preserved upon reflection from a mirror. I will show the evidence of the amplification of the chiral properties in a planar microcavity and some interesting phenomena at the microscopic level.

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Place : S4-625
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Colloquium