From High-resolution Mechanisms to Applications for CRISPR-Cas

CRISPR-Cas serves as an RNA-based adaptive immunity system in prokaryotes. The diverse CRISPR systems can be categorized into two major classes and multiple types therein. Type I CRISPR-Cas (or CRISPR-Cas3) belongs to Class 1 and is the most prevalent CRISPR system found in nature. In part I of my talk, I will give a comprehensive explanation of CRISPR-Cas3 based interference mechanism, based on the high-resolution biochemistry and structural biology work from my lab. I will further explain CRISPR-Cas3 based genome editing applications.

As an acquired immunity system, CRISPR-Cas relies on the Cas1-Cas2 integrase complex to insert new spacers into the CRISPR array. This leads to the synthesis of new guide RNAs that direct the effector complex to complementary foreign genetic targets. In part II of my talk, I will present our work on generating the high-resolution mechanisms for Cas1-Cas2 mediated spacer acquisition process.