First-principle-based and data-driven design platform for small molecule drugs and antimicrobial peptides

Lee-Wei Yang
Institute of Bioinformatics and Structural Biology, National
Tsing Hua University, Hsinchu 300044, Taiwan.

In this talk, I will first demonstrate how well parameterized small molecules can be correctly ranked against a targeted binding site by docking and simulation results, where new drugs can be discovered by re-assembling fragments from a relatively safe chemical space. Leveraging the off-target effects to re-define specificity, we demonstrated that allosteric drugs and interface blockers can bring therapeutic synergy to inhibit an oncogenic autophagic enzyme ATG4B together with a known orthosteric (active-site) drug. If time allows, I will share how we improve and/or design new antimicrobial peptides by circular permutation, free energy calculation, sink and surface simulations and data-driven approaches.