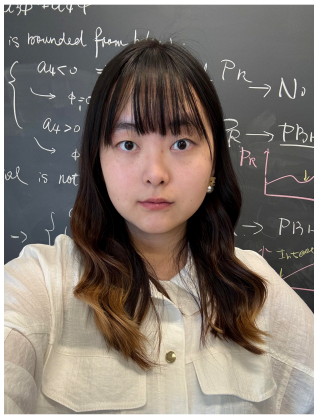
Tuesday, Oct 28, **4:15pm** I PAB 4-708 I Zoom: 517 486 4983

Xinpeng Wang

(Kavli IPMU)



Gravitational Waves from the Fifth-Force Mergers

Dark matter fermions interacting via attractive fifth forces mediated by a light mediator can lead to the formation of dark matter halos in the very early universe. We show that binary systems composed of these halos are capable of generating gravitational wave (GW) signals detectable today, even when the individual halos are very light. Since the Yukawa-like force, which is much stronger than gravity, dominates the dynamics of these halo binaries, large GW signals can be produced at initially extremely high frequencies, even though the sources are very light. Over cosmic time, these GWs are then redshifted to frequency bands accessible to current or future GW observatories. In addition, the resulting GW signals carry distinctive features that enable future observations to distinguish them from conventional ones. Notably, even if only a tiny fraction of dark matter experiences strong fifth-force interactions, GW signals arising from such effects could provide a new avenue to discover self-interacting dark matter through GW observations.