Date	Time	Speaker	Affiliation	Title	Abstract
2022-03-24	10am	Zhen PAN 潘震	Perimeter Institute	Extreme mass ratio inspirals: wet, dry and mass-gap	In this work, we propose a new subclass of extreme-mass-ratio-inspirals (EMRIs): mass-gap EMRIs, consisting of a compact object in the lower mass gap (2.5--5 Msun) and a massive black hole (MBH). The mass-gap object (MGO) may be a primordial black hole or produced from a delayed supernova explosion. We calculate the formation rate of mass-gap EMRIs in both the (dry) loss-cone channel and the (wet) active galactic nucleus disk channel by solving Fokker-Planck-type equations for the phase-space distribution. In the dry channel, the mass-gap EMRI rate is strongly suppressed compared to the EMRI rate of stellar-mass black holes (sBHs) as a result of mass segregation effect. In the wet channel, the suppression is roughly equal to the mass ratio of sBHs over MGOs, because the migration speed of a compact object in an active galactic nucleus disk is proportional to its mass. We find that the wet channel is much more promising to produce mass-gap EMRIs observable by spaceborne gravitational wave detectors.
2022-03-31		Yang ZHOU 周洋	Fudan University	Partial reduction and black hole information （额外维部分约化与黑洞信息）	Black hole information paradox is a well known problem. Recent progress hints towards a new understanding of the late time black hole interior as part of the Hawking radiation, which they called island. In particular the island formula for the radiation entropy gives Page curve and therefore maintains unitarity. In this talk I will discuss how to derive Page curve from holography. We provide an explicit construction of gravity system attached with bath by gluing Randall-Sundrum reduction and Maldacena duality, and derive Page curve from holography. We also provide a holographic construction for cosmology based on partial reduction. Our approach hints towards an origin of the holographic nature of black holes as well as our universe.

2022-04-07	10am	Heling DENG邓鹤凌	Arizona State University	Gravitational wave background from supermassive primordial black holes	The Peters formula, which tells how the coalescence time of a binary system emitting gravitational radiation is determined by the initial size and shape of the elliptic orbit, is often used in estimating the merger rate of primordial black holes and the gravitational wave background from the mergers. Valid as it is in some interesting scenarios, such as the analysis of the LIGO-Virgo events, the Peters formula fails to describe the coalescence time if the orbital period of the binary exceeds the value given by the formula. This could underestimate the event rate of mergers that occur before the time of recombination. As a result, the energy density spectrum of the gravitational wave background could develop a peak from mergers of supermassive primordial black holes (M > 10^5 M ⊙). This can be used to constrain the fraction of dark matter in primordial black holes if potential probes do not discover such a background. We then consider the effect of mass accretion onto primordial black holes at redshift z ~ 10, and find that the merger rate could drop significantly at low redshifts. The spectrum of the gravitational wave background thus gets suppressed at the high-frequency end. This feature might be captured by future detectors such as ET and CE.
2022-04-08	10am	Weidou NI 倪维斗	National Tsing Hua University	迈克尔逊干涉与时间延迟干涉	空间激光干涉引力波探测基本上是一种广义的迈克尔逊干涉。迈克尔逊干涉是将一束光的波前分成两部分，形成不同路径的两束光，会合到相同位置产生的干涉。迈克尔逊干涉自十九世纪发明以来，一直是一种高精密度的测量方法。其要求是其两个路径的光程差小于其同调长度。引力波对两个路径的光程有不同的影响。空间激光干涉引力波探测即利用迈克尔逊干涉探测此光程差，以测定到达的引力波。本演讲讨论此广义的迈克尔逊干涉对实现空间引力波探测所需的灵敏度及其对路径（轨道）设计和核心噪声（激光测长和惯性传感）的要求。
2022-04-21				TBA	TBA
2022-04-28				TBA	TBA
2022-05-05					

2022-05-12	10am	Cheng PENG 彭程	UCAS Kavli Institute for Theoretical Physics	Ensemble averages, factorization, and (half-)wormholes	Ensemble average theories have attracted a lot of attention in the past few years since they are shown to be, at least as some effective descriptions, inevitable to reproduce holographic computation results from bulk gravitational path integrals. On the other hand, ensemble average theories come with their own puzzles, among which the factorization puzzle is probably the most notable one. I will briefly introduce different proposals to resolve the factorization puzzle, such as the alpha-states proposal and the half-wormhole proposal, and then discuss some of our recent exercises and findings in both directions.
2022-05-19	10am	Alejandro Cárdenas-Avendaño	Princeton University	Tidally-induced nonlinear resonances in EMRIs with an analogue model	One of the important targets for the future space-based gravitational wave observatory LISA is extreme mass ratio inspirals (EMRIs), where long and accurate waveform modeling is necessary for detection and characterization. When modeling the dynamics of an EMRI, several effects need to be included, such as the modifications caused by an external tidal field. The impact of such perturbations will generally break integrability at resonance, and can produce significant dephasing from an unperturbed system. In this talk, I will show how we use a Newtonian analogue of a Kerr black hole to study the effect of an external tidal field on the dynamics and the gravitational waveform. I will present a numerical framework that takes advantage of the integrability of the background system to evolve it with a symplectic splitting integrator and compute approximate gravitational waveforms to estimate the time scale over which the perturbation affects the dynamics. I will show how different entry points into resonance lead to different dynamics and the numerical scale (relative to the mass ratio) for when the tidal perturbation's impact is relevant. If these effects are not accounted for, they could lead to incorrect parameter estimation or fundamental biases when studying general relativity
2022-05-26	10am	Postoned			

2022-06-02	4pm	Hector O. Silva	Max Planck Institute	Binary black hole coalescence in scalar-Gauss-Bonnet gravity	It was recently shown that gravity theories that couple a dynamical scalar field to the Gauss-Bonnet invariant can lead to spontaneous scalarization of black holes, allowing these objects to grow "scalar hair" once certain conditions are met and to remain "bald" otherwise. While most works on the topic have focused on isolated black holes, progress has recently been made in understanding this effect in binary black hole systems. I will give an overview of what has been achieved so far in this context. I will discuss new phenomena that happen in black-hole binaries and explore some of the potential observational consequences of these results in gravitational-wave astronomy.
2022-06-09	4pm	Mauro Pieroni	Imperial College London	Production (and direct detection) of signature in the stochastic gravitational wave background	The talk is divided in two parts. Mauro Pieroni will first discuss some early Universe mechanisms that leave observable signatures (non-trivial frequency shape, chirality, ...) in the stochastic gravitational wave background (SGWB). In particular, Mauro Pieroni will discuss gauge field production during (and at the and of) axion inflation and (scalar) particle production during preheating. The second part of the talk will focus on methods to detect, and possibly characterize, these signatures with future space based detectors like LISA and Taiji.
2022-06-16	10am	Song HE 何松	Jilin University	Probing QCD critical point and induced gravitational wave by black hole physics	The Quantum Chromodynamics (QCD) phase diagram involves the behaviors of strongly interacting matter under extreme conditions and remains an important open problem. Based on the non-perturbative approach from the gauge/gravity duality, we construct a family of black holes that provide a dual description of the QCD phase diagram at finite chemical potential and temperature. The thermodynamic properties of the model are in good agreement with the state-of-the-art lattice simulations. We then predict the location of the critical endpoint and the first-order phase transition line. Moreover, we present the energy spectrum of the stochastic gravitational-wave background associated with the QCD first-order transition, which is found to be detected by IPTA and SKA, while by NANOGrav with less possibility. If the time is allowed, we will present how to construct a holographic model for a pure gluon system.

2022-06-23	10am	Huajia WANG 王华嘉	UCAS Kavli Institute for Theoretical Physics	Shape Dependence of Mutual Information in OPE Limit	Mutual information is an important measure of correlation between disjoint regions. On the other hand, the shape dependence of entanglement measure could reveal important aspects of the organizing principles for entanglement structures. In this talk, we discuss the linear response of shape deformation about two spheres in the limit of large separation. We comment on the implication of our result in terms of extremization properties of mutual information between spheres.
2022-07-01	2pm	Qiang WEN文强	Southeast University	Balanced Partial Entanglement and Mixed State Correlations	Firstly, we will introduce the concept of the balanced partial entanglement entropy (BPE) and how to compute it. Let us consider a mixed state A \cup B in two dimensional theories, we will show that the BPE exactly gives the length of the entanglement wedge cross-section in both AdS/CFT and 3d flat holography. The BPE reduces to the reflected entropy in canonical purifications, but can be calculated in generic purifications. It can be decomposed into the mutual information and an additional universal tripartite entanglement (which is known as the Markov gap in the canonical purification) when A and B are adjacent. We find that the universal tripartite entanglement is just the minimal value of the crossing PEE. The BPE is conjectured to be independent from the purifications, and we will give serval non-trival tests for this conjecture.