Poster Session (Group A)

PA1	Chiaki Nasu	Rikkyo University
Stars in K-mouflage gravity		
K-mouflage gravity is one of scalar-tensor theory that is included in modified gravity. The theory has a screening mechanism. It is shown that the effect in solar system is almost none. However, the effect of relativistic stars is uncertained. Then, I study screening effect of relativistic stars in K-mouflage gravity.		

PA2	Hiromu Ogawa	Rikkyo Univ.
Relativistic stars in a cubic Galileon universe		
Recently it was pointed out that the de Sitter-like black hole solution with nontrivial scalar hair which depends linearly on time exists in the cubic Galileon theory. The non-trivial scalar hair modifies the cosmological constant, corresponding to three branches (black hole solutions): self-accelerating and self-tuning solutions. We numerically construct relativistic star solutions where the external spacetime is the de Sitter spacetime obtained in the previous work.		

PA3	Yuta Hiranuma	Niigata University
Data Analysis of Gravitational Waves from Core Collapse Supernovae with Hilbert-Huang Transform (I)		
We apply the analysis of Hilbert-Huang transform to gravitational wave signals from core-collapse supernovae. In this poster, we discuss the properties of time-frequency maps obtained by Hilbert-Huang transform.		

PA4	Kodai Ueda	Department of Physics, Kindai University
Massive vector field perturbations on extremal static black holes		
We show a new perturbation method to study the dynamics of massive vector fields on extremal and near-extremal static black hole spacetimes. On such backgrounds, one can classify the components of massive vector fields into the vector- and scalar-type components. For the vector-type components the Proca equation reduces to a single master equation, whereas the scalar-type components remain coupled. By expanding the geometry and massive vector field with respect to λ, we show that the Proca equation for the scalar-type components at each order of λ can reduce to a set of two mutually decoupled wave equations of which the source terms consist only of the lower-order variables. Therefore, together with the vector-type master equation, we obtain the set of three decoupled master wave equations, each of which governs each of the three independent dynamical degrees of freedom of the massive vector field.		

PA5	Taisaku Mori	Nagoya University
RGE and gravitational coupling constants		
We propose a simple and totally covariant model which may realize the Inflation and late-time acceleration. In our model, the change of scale factor can be identified with the scale transformation, we may construct the renormalization group equations for the scalar fields. We assume that the renormalization group equations has the UV and IR fixed point which may realize inflation or late time acceleration and construct the corresponding effective Lagrangian.		

PA6	Priti Gupta	Waseda University
Gravitational Waves and Chaos		
We study gravitational waves from a particle moving around a system of a point mass with a disk in Newtonian gravitational theory.A particle motion in this system can be chaotic when the gravitational contribution from a surface density of a disk is comparable with that from a point mass. We aim to observe the energy spectra of gravitational waves from chaotic orbits taking into account the radiation reaction force.		

PA7	Shu Ueda	Tokyo Gakugei University
Discrete Integrable Systems and Its Application to Discretization of Geodesics		
It is known that there might exist discrete spacetimes, which is one of the implications of quantum gravity. In this talk, we focus on the discrete nature of spacetimes in classical gravity by considering the discretization of the geodesics around black hole spacetimes based on the discrete integrable geometry. We will also argue how we may be able to apply the discretization of geodesics to a proper discretizaion of the spacetime geometry.		

PA8	Ryunosuke Kotaki	Hirosaki University
More accurate equation for the gravitational lens		
Based on a collaboration with Shinoda, Suzuki and Asada, we will give a poster presentation on the gravitational lens. We discuss a new formulation that enables more accurate calculations for the gravitational lens.		

PA9	Yuto Kimura	Hiroshima University
Gravitational radiation driven by magnetosphere rearrangement at the time of magnetar giant flare		
Magnetar flare is one of energetic astronomical events. Total energy observed so far in electromagnetic band was of order 10^{46} ergs. The event is rare, and the energy scale is not observational fixed by the past observations. Hyper flare might be seen in future. In the present multi-messenger era with gravitational wave astronomy, it is important to consider gravitational radiation at the hyper/giant flares. In this paper, we discuss the possibility driven by rearrangement of external magnetic fields around a magnetar.		

PA10	Shoichiro Miyashita	Waseda University
Energy spectrum of spacetime: complex saddle points in Euclidean path integral		
The partition function(al) of spacetime may be given by summing over suitable Euclidean histories. Although Euclidean path integral of General Relativity must have complex contour to avoid the divergent problem, the complex saddle point have been attracted not so much attentions when we evaluate the partition function. In this work, we evaluate the partition function of spacetimes with static spherical cavity by approximating it to minisuperspace path integral. Especially, we discuss the micro canonical partition function and energy spectrum of spacetimes.		

PA11	Tomohiro Nakamura	Nagoya University
Instability of stars in screened modified gravity		
Modified gravity theories often have additional degrees of freedoms, which affect the motion of bodies. In order to evade the constraint for such		

PA12	Shingo Akama	Rikkyo University
Primordial non-Gaussianities from bouncing cosmology in the Horndeski theory		
The curvature perturbation grows in time in a contracting phase unlike the inflationary phase and this difference between two phases appears in the primordial bispectra. In a poster session, we investigate the primordial bispectra in the case of bouncing models using the Horndeski theory and discuss whether or not we can observationally distinguish bouncing models from inflation models.		

PA13	NAEEM AHMAD PUNDEER	ALIGARH MUSLIM UNIVERSITY, INDIA
Semiconformal Curvature tensor the spacetime of General Relativity		
The aim of the present paper is to study the semiconformal curvature tensor for spacetime of general relativity. We establish the subsistence of Killing and conformally Killing vectors satisfying EFE for the case when semiconformal curvature tensor vanishes. We extend the same case for the study of cosmological models with dust and perfect fluid.		

PA17	Hirotaka Yoshino	Osaka City University
Improved analysis of axion bosenova		
String theories predict the existence of many axionlike scalar fields with ultralight mass. If such a scalar field exists, it forms an axion cloud around a rotating black hole by extracting the rotation energy through superradiant instability. In our previous works, we claimed that the nonlinear self-interaction of the axion cloud causes a violent phenomena called		

PA18	Sousuke Noda	Yukawa Institute for Theoretical Physics, Kyoto University
Optical Berry phase in the gravitational lensing by Kerr black hole		
Optical Berry phase is one of the geometrical phases which can be understood as a classical effect by calculation of evolution of the polarization vector of a light ray. This classical geometrical phase has been observed in an experiment with an optical fiber by Tomita and Chao (1986). Actually, a similar situation to the above experiment can be found in the gravitational lensing of a polarized light by a Kerr black hole. In this poster presentation, to show this, we calculate the evolution of the polarization vector of a light ray propagating in the Kerr spacetime.		

PA19	Yoshiyuki Morisawa	Osaka City University
On cohomogeneity-one-string integrability of quasi-maximally symmetric spacetimes		
We introduced the concept of cohomogeneity-one(C1)-string integrability of a spacetime, which means that all allowed C1 strings(i.e., strings with geometrical symmetry) are Liouville integrable. Since maximally symmetric spacetimes (or direct products of them) are C1-string integrable, we investigate C1-string integrability of two types of pp-wave solutions as quasi-maximally symmetric spacetimes. We show that they both admit 7 Killing vectors and are both geodesically integrable, but one of them is C1-string integrable and another is not. This may imply the existence of a different type of hidden symmetry probed by C1 strings (and not probed by particles).		

PA20	Tomohiro Harada	Department of Physics, Rikkyo University
Uniqueness of static, isotropic low-pressure solutions of the Einstein-Vlasov system		
It is shown that this uniqueness theorem by Beig and Simon for a perfect-fluid system can be applied to isotropic Vlasov matter, if the gravitational potential well is shallow. To this end we first show how isotropic Vlasov matter can be described as a perfect fluid giving rise to a barotropic equation of state. This 'Vlasov' equation of state is investigated and it is shown analytically that the requirements of the uniqueness theorem are met for shallow potential wells. Finally the regime of shallow gravitational potential is investigated by numerical means. An example for a unique static solution is constructed and it is compared to astrophysical objects like globular clusters. Finally we find numerical indications that solutions with deep potential wells are not unique.		

PA21	Takahiro Tanaka	Department of Physics Kyoto University
Testing gravity using gravitational waves		
I'll report the overview of the recent progress of the research group on testing gravity theory using gravitational wave data, which is one of the targeted subject of the innovative area.		

PA22	Hideki Ishihara	Osaka City University

Particle acceleration by ion-acoustic solitons in plasma

We propose a new acceleration mechanism for charged particles by using cylindrical or spherical non-linear acoustic waves propagating in ion-electron plasma. The acoustic wave, which is described by the cylindrical or spherical Kortweg-de Vries equation, grows in its wave height as the wave shrinks to the center. Charged particles confined by the electric potential accompanied with the shrinking wave get energy by repetition of reflections. We obtain power law spectrums of energy for accelerated particles. As an application, we discuss briefly that high energy particles coming from the Sun are produced by the present mechanism.

PA25	Yasunari Kurita	Kanagawa Institute of Technology

Emergence of AdS3 thermodynamic quantities in extremal CFT

A candidate for quantum theory of pure AdS_3 gravity is extremal CFTs. It is known that these theories show the three-dimensional Hawking-Page transition: at low temperature, the system behaves like AdS_3 and at high temperature, it does BTZ black hole. In this presentation, we calculate thermodynamic quantities in canonical ensemble and observe Hawking-Page transistion in terms of entropy and angular momentum as the order parameters. We note that, at low temperature, there are no entorpy and no angular momentum even though the system has finite temperature and finite angular velocity. It implies that entropy and angular momentum emerging at higher temperature is genuine

PA26	Hajime Sotani	National Astronomical Observatory of Japan

Pulse profiles of highly compact pulsars in general relativity

Gravitational light bending by compact stars is an important astrophysical phenomenon. The bending angle depends on the stellar compactness, which is the ratio of stellar mass M to radius R. In this paper, we investigate the pulse profile of highly compact rotating neutron stars for which the bending angle exceeds $\pi/2$. When $M/R > 0.284$ (the bending angle becomes equal to $\pi/2$ for the stellar model with $M/R = 0.284$), such a large bending happens, resulting in that a photon emitted from any position on the stellar surface can reach an observer. First, we classify the parameter plane of inclination angle i and angle Θ between the rotation axis and the normal on the hot spot by the number of photon paths reaching the observer. Then, we estimate the time-dependent flux of photons emitted from two hot spots on the rotating neutron star, associated with the magnetic polar caps, for various combinations of i and Θ, and for two values of compactness, assuming that the stellar rotation is not so fast that the frame dragging and the stellar deformation are negligible. As the result, we find that the pulse profiles of highly compact neutron stars are qualitatively different from those for the standard neutron stars. In particular, the ratio of the maximum observed flux to the minimum one is significantly larger than that for the standard neutron stars. This study suggests that one would be able to constrain the equation of state for neutron stars through the observation of pulse profile with angles i and Θ determined by other methods.

PA27	Naoki Seto	Kyoto Univeristy

Eccentricity evolution of stars around shrinking massive black hole binaries

Based on the secular theory, we discuss the orbital evolution of stars in a nuclear star cluster to which a secondary massive black hole is infalling with vanishing eccentricity. We find that the eccentricities of the stars could show sharp transitions, depending strongly on their initial conditions. By examining the phase-space structure of an associated Hamiltonian, we show that these characteristic behaviors are partly due to a probabilistic bifurcation at a separatrix crossing, resulting from the retrograde apsidal precession by the cluster potential. We also show that separatrix crossings are closely related to realization of a large eccentricity and could be important for astrophysical phenomena such as tidal disruption events or gravitational wave emissions.

PA28	Norichika Sago	Kyushu University

Gravitational radiation from a spinning particle orbiting a Kerr black hole

We investigate the energy flux of gravitational waves emitted by a spinning particle moving along a slightly inclined, circular orbit in Kerr spacetime, by using the black hole perturbation technique. To construct the energy-momentum tensor of a spinning particle as a source of the perturbation, we solve the Mathisson-Papapetrou equations up to the first order of the spin and the second order of the orbital inclination. We calculate the perturbation analytically by solving the Teukolsky equation with the Mano-Suzuki-Takasugi method. Finally, through the flux formula, we derive the energy flux radiated to infinity in terms of the post-Newtonian expansion.

PA29	Yuko Mori	Rikkyo

Effects of Goldstone mode in Generalized Higgs Inflation

Higgs inflation is one of the inflation model which consider Higgs field as inflaton. Higgs inflation is always treated as a single field inflation model, but due to symmetry breaking, because of Higgs having a vacuum expectation, we have to think about the effect of Goldstone mode. From the result of previous research(Greenwood, 2013), it is known that the effects of Goldstone mode are very weak, and becomes like thinking a single field model. I studied the effects of Goldstone mode in the more general Higgs inflation model, Higgs G-Inflation(Kamada, 2011), and I'll talk about this study and discuss Higgs G-Inflation is whether think as a single field model.

Poster Session (Group B)

PB1	Yuki Hagihara	Hirosaki University
GW polarizations with aLIGO, Virgo and KAGRA		
Based on a collaboration (Y.Hagihara, N.Era, D.Iikawa, H.Asada :arXiv:1807.07234), we are giving a poster presentation on GW polarizations with Advanced LIGO, Advanced Virgo and KAGRA. Assuming that, for a given source of GWs, we know its sky position, as a case of GW events with an electromagnetic counterpart such as GW170817, we discuss a null stream method to probe GW polarizations including spin-0 (scalar) GW modes and spin-1 (vector) modes.		

PB2	Kazuma Tani	Yamaguchi university
Possibility of forming unstable circular orbit of photon in boson star		
A boson star (BS) is a star formed of a scalar field. A BS doesn't interact electromagnetically but does gravitationally, and it is considered to be a candidate for dark matter. Observationally, it could be confused with a black hole (BH) if it is sufficiently compact. In this research, we discuss how compact a BS can be for a scalar field with a non-minimal coupling and whether it has an unstable circular orbit of photon or not.		

PB3	Keisuke Nakashi	Rikkyo University
Negative deflection angle in three-dimensional massive gravity		
We study the massless geodesics in a static circularly symmetric (SCS) black hole spacetime which is a solution in the (2+1)-dimensional massive gravity. We obtained analytic solutions for the massless geodesic equation and an explicit form of a deflection angle. We found that for different values of impact parameter the deflection angle can be positive, negative even zero in this black hole spacetime.		

PB4	Yashmitha Kumaran	University of Sussex
Gravitational waves from plasma turbulence		
The consequence of the first-order phase transitions, presumed to have ensued in the early universe, is contemplated to be the emergence of the primordial gravitational waves. The effects of bubble nucleation, growth and coalescence is considered to have given rise to the first-order phase transition, triggering plasma turbulence and sourcing the gravitational waves. This is accomplished by modelling the first-order phase transition as a stationary turbulent fluid and employing relativistic hydrodynamic equations to estimate the various spectra of the relic gravitational wave background, such as velocity, anisotropic stress, amplitude and frequency. A new model, modified for the correlation function of the stationary (Kolmogorov) turbulence, is presented here. The final plots of the procured model produced a corrected analytical variation that retained the wavenumber range of the spectra dictated by the existing models. Since the gravitational wave emission emerging from turbulence driven by phase transitions conveniently peaks at the Kolmogorov de-coherence frequency, the experimental sensitivities of gravitational wave detectors can be improved with this analysis to accomplish a successful detection in the future.		

PB5	Yukinobu Watanabe	Niigata University
Data Analysis of Gravitational Waves from Core Collapse Supernovae with Hilbert-Huang Transform (II)		
We perform the analysis of gravitational waves from core collapse supernovae by using Hilbert-Huang transform. We focus on the signal from standing accretion shock instability. In this poster, we report on the current results.		

PB6	Kazutaka Sadohara	Tokyo Gakugei University
Black hole and naked singularity in (2+1)-dimensional Einstein-Scalar gravity with potential		
We considered static and spherically symmetric exact gravitational solutions in a (2+1)-dimensional Einstein-scalar theory with potential. The solutions correspond to black holes and spacetimes with naked singularities. In particular, when the scalar charge is set to a specific value or less, only the scalar self-interaction potential decides the spacetime structures. We will refer the effects of the scalar potential on the spacetimes and will argue the observational implication.		

PB7	Tadashi Sasaki	Hokkaido University
Exact solutions of primordial gravitational waves		
Time evolution of gravitational waves in the cosmological background, i.e. Friedmann-Robertson-Walker spacetime, is considered. Although analytic solutions in the cases of single matter component (e.g. radiation dominant) are known, numerical integration or some approximation is needed to treat the transition eras. By considering the 3rd order differential equation satisfied by the square of the amplitude, we obtained exact solutions of gravitational wave equation in the presence of non-relativistic matter and the cosmological constant in terms of Weierstrass's elliptic functions.		

PB8	Kanna Takagi	Tokyo Gakugei University
Realization of the Change of Effective Dimension in Gravity via Multifractional Theories		
Most candidate theories of quantum gravity suggest the possibility that spacetimes become effectively lower-dimensional at small scale, despite their diversity. This means that we have to consider the dimensional flow in gravity. To this end, we focus on multifractional theory that makes it possible to change effective dimension at different scales. In this talk, we begin with the introduction of the multifractional theory and explore some physical implications by the change of the effective dimension in the early universe and black hole spacetimes.		

PB9	Satoru Sugimoto	Fukushima University Faculty of Symbiotic Systems Science

The Research about Cosmological Magnetic Fields and Primordial Gravitational Waves in Inflationary Cosmology

I research the cosmological magnetic fields and primordial gravitational waves in inflationary cosmology. To clarify the origin of initial density fluctuations for the source of cosmological structure, I study the behavior of inflation fields by numerical calculation.

PB10	Takuya Katagiri	Rikkyo University

The instability of small charged AdS Black Hole

I will talk about the following issues.First,the relation between the instability of small charged AdS black hole and boundary condition on AdS boundary.Next,Its final fate.

PB11	Keitaro Tomikawa	Rikkyo University

Gauge dependence of gravitational waves induced by curvature perturbations

Considering cosmological perturbation theory up to the second order, second-order gravitational waves are induced from scalar perturbations. The second-order gravitational wave has gauge dependency unlike first order. However, the second-order gravitational wave was mainly calculated only by the Newtonian gauge, and it was not much discussed in other gauges. We calculate the second-order gravitational wave induced from curvature perturbation with comoving gauge in the universe dominated by the perfect fluid of barotropic parameter w. Also, we evaluate the gauge dependence of the second-order gravitational wave quantitatively by gauge transformation of the obtained result.

PB12	Daiske Yoshida	Kobe University

Primordial gravitational waves in Chern-Simons modified gravity

Recently, Lunin found the separation ansatz of Maxwell field in Kerr spacetime. This method has the possibility of Separation variables of the metric of spacetime. To challenge this problem, we study the form field on Schwarzschild-Tangherlini metric in D-dim for preparation. Because, in 4-dim, the 2-form field exist, and it is equivalent to the scalar field. Although the p-form fields appear in higher dimensions, their master equations are lacked. In this poster, we define the separation variables of the 2-form field in D-dimensional Schwarzschild-Tangherlini spacetime and give the master equation.

PB13	Masashi Kuniyasu	Yamaguchi-University

Integrable higher-dimensional cosmology with separable variables in an Einstein-dilaton-antisymmetric field theory

We consider a D-dimensional cosmological model with a dilaton field and two $(D-d-1)$-form field strengths which have nonvanishing fluxes in extra dimensions. Exact solutions for the model with a certain set of couplings are obtained by separation of three variables. Some of the solutions describe accelerating expansion of the d-dimensional space. Quantum cosmological aspects of the model are also briefly mentioned.

PB14	Yamato Matsuo	Hiroshima University

Chameleonic Dark Matter in Logarithmic F(R) gravity

When we consider quantum correction, one can write $F(R)$ gravity as logarithmic form. The inflation theory of logarithmic $F(R)$ gravity is already discussed by S.D.Odintsov, V.K.Oikonomou, L.Sevastiani. When we shift $F(R)$ gravity to Einstein frame from Jordan frame, modified effect can be explained by scalar particle, scalaron. I study the description of scalaron by logarithmic $F(R)$ gravity, especially slow-roll parameter and constraint of scalaron's mass for Dark Matter candidate.

PB15	Kouji Nakamura	National Astronomical Observatory of Japan

Extension of the input-output relation for a Michelson interferometer to arbitrary coherent-state light sources: Gravitational-wave detector and weak-value amplification

An extension of the input-output relation for a conventional Michelson interferometric gravitational-wave detector is carried out to treat an arbitrary coherent state for the injected optical beam. This extension is one of necessary researches toward the clarification of the relation between conventional gravitational wave detectors and a simple model of a gravitational-wave detector inspired by weak-measurements in Nishizawa (2015). The derived input-output relation describes not only a conventional Michelson-interferometric gravitational-wave detector but also the situation of weak measurements. As a result, we may say that a conventional Michelson gravitational-wave detector already includes the essence of the weak-value amplification as the reduction of the quantum noise from the light source through the measurement at the dark port.

PB16	Takahisa Igata	Rikkyo University

Bright edge of a near extremal Kerr black hole shadow

The Kerr black hole has spherical photon orbits near the event horizon. In the near extremal limit, we show that a part of these orbits converges on the horizon but taking the different ranges of a zenith angle. Relating such tangents to the principal null, we discuss the luminosity of the edge of the black hole shadow.

PB17	Tatsuya Narikawa	Theoretical Astrophysics Group, Kyoto University

Reanalysis of GW170817

We reanalyse the binary neutron-star merger GW170817. We find that tidal deformability estimated by using gravitational-wave data of GW170817 and the default TaylorF2 waveform differs in a non-negligible manner between the Hanford and Livingston detectors of Advanced LIGO. We also reanalyse GW170817 using our improved numerical-relativity waveforms. While data of both detectors are consistent within statistical uncertainties, the discrepancy suggests that an in-depth study of noise realization might improve the parameter estimation. Our preliminary analysis suggest that the discrepancy becomes severe when we adopt sophisticated waveform models in parameter estimation.

PB18	Naoki Tsukamoto	Tohoku University

Linear stability analysis of a rotating thin-shell wormhole

It is expected that rotations make wormholes stable. We investigate the linear stability of a thin shell of the rotating wormhole against radial perturbations. We show that the wormhole becomes more and more stable the larger its angular momentum is until the angular momentum reaches a critical value and that the behavior of a condition for stability significantly changes when the angular momentum exceeds the critical value. We find that the overcritical rotating wormhole has the radius of the thin shell, which is stable regardless of the equation of state for the barotropic fluid.

PB19	Takashi Hiramatsu	Rikkyo University

CMB bispectra induced by lensing

We investigate the CMB bispectra induced by the lensing effect including the curl-mode as well as the usual gradient-mode. To quantify the amplitude and the shape of those bispectra, we estiamte the signal-to-noise ratio for each signal and $f_{\rm NL}$ parameters with the four kinds of frequently-used templates, local/equilateral/orthogonal/folded-type.

PB20	Kiyoshi Shiraishi	Yamaguchi University

An ostentatious model of cosmological scalar-tensor theory

We consider a novel model of gravity with a scalar field described by the Lagrangian with higher order derivative terms in a cosmological context. The model has the same solution for the homogeneous and isotropic universe as in the model with the Einstein gravity, notwithstanding the additional higher order terms.

PB21	Hisaaki Shinkai	Osaka Institute of Technology

INO: Interplanetary Network of Optical Lattice Clocks

The new technique of measuring frequency by optical lattice clocks now approaches to the relative precision of $(\Delta f/f) = O(10^{-18})$. We propose to place such precise clocks in space and to use Doppler tracking method for detecting low-frequency gravitational wave below 1 Hz. Our idea is to locate three satellites at one A.U. distance (say at L1, L4 & L5 of the Sun-Earth orbit), and apply the Doppler tracking method by communicating "the time" each other. Applying the current available technologies, we obtain the sensitivity for gravitational wave with three or four-order improvement ($h_{\rm n} \sim 10^{-17}$ or 10^{-18} level in 10^{-5}Hz – 1 Hz) than that of Cassini satellite in 2001. This sensitivity enables us to observe black-hole mergers of their mass greater than $10^5 M_\odot$ in the cosmological scale. Based on the hierarchical growth model of black-holes in galaxies, we estimate the event rate of detection will be 20-50 a year. We nickname "INO" (Interplanetary Network of Optical Lattice Clocks) for this system, named after Tadataka Ino (1745–1818), a Japanese astronomer, cartographer, and geodesist. [arXiv:1809.10317]

PB22	Atsushi Miyauchi	Research Organization for Information Science and Technology

Reformulating Yang-Mills Fields as a Non-Abelian Electromagnetism

As a preliminaly step to Einstein equations, Yang-Mills equations are reformulated as a non-Abelian electromagnetism using differential forms. Formulation proceeds parallel to Maxwell equations as far as possible. In addition, I will discuss how can I manage constraints for numerical calculation.

PB23	Koichi Hirano	Tsuru University

Inflation inspired by the string theory with Planck and future CMB data

We study inflation models inspired by the string field theory. These inflation models predict the very small value of the tensor-to-scalar ratio r. The primordial density perturbations are parametrized by the spectral index n_s and the tensor-to-scalar ratio r, and they are constrained by the Planck data combined with other CMB and cosmological observations. We investigate the allowed region of the model parameter obtained from the Planck data. Furthermore, we discuss comparison of future tensor-to-scalar ratio data with the predictions by the inflation models inspired by the string theory, focusing on part of the quantum fluctuation origin.

PB24	Akihiro Yatabe	Waseda University

Collisional Electric Penrose Process in Flat Spacetime

The Penrose process is an impressive physical process in the framework of general relativity. This process is that an object splits into two objects in the so-called ergoregion of a rotating black hole and that one of them gains energy. It is known that it also occurs around a static charged black hole. Recently, the process of gaining energy is shown to be possible even in the limit of the flat spacetime and energy is extracted from the electric potential energy in this case. In this study, we assume whether the collisional Penrose process of two photons is possible when we consider the two-photon pair annihilation, which makes an electron-positron pair. We also consider the case for the Born-Infeld theory, which is a nonlinear theory of electrodynamics, as well as the Maxwell theory.

PB25	Shin'ichirou Yoshida	Department of Earth Science and Astronomy, The University of Tokyo

Rotating merger remnant models of white dwarf binaries

We present new numerical models of rapidly rotating white dwarfs with strong degree of differential rotation and thermal stratification. The model has a core composed of ions and completely degenerate electrons and has an isentropic envelope composed of ions, photons, partially degenerate electrons and positrons. The models are intended to mimic very early phases of remnants of white dwarf binary mergers, some of which may lead to type Ia supernovae.

PB26	Norihiro Tanahashi	Institute of Mathematics for Industry, Kyushu University

Separability of Maxwell equation in rotating black hole spacetime and its geometric aspects

Studies on perturbative dynamics of fields in stationary black hole spacetime have a long history, and in this context the Maxwell field had been difficult to treat since one of its two physical modes does not admit the separation of variable. Rather recently, Lunin made a breakthrough about this problem by introducing a special ansatz for the dynamical variables that enables the separation of variables for perturbations of rotating black hole in any spacetime dimensions. In this talk, we review this new technique and try to clarify why this technique works from a geometric point of view.

PB27	Keisuke Izumi	Nagoya University

S-matrix Unitarity and Renormalizability in Higher Derivative Theories

We investigate the relation between the S-matrix unitarity ($SS^\dagger = 1$) and the renormalizability, in theories with negative norm states. The relation has been confirmed in many theories, such as gauge theories, Einstein gravity and Lifshitz-type non-relativistic theories by analyzing the unitaritybound, which follows from the S-matrix unitarity and the norm positivity. On the other hand,renormalizable theories with a higher derivative kinetic term do not necessarily satisfy the unitarity bound essentially because the unitarity bound does not hold due to the negative norm states. In these theories, it is not clear if the S-matrix unitarity provides a nontrivial constraint related to the renormalizability. In this poster, we introduce scalar field models with a higher derivative kinetic term and analyze the S-matrix unitarity. We have positive results of the relation

PB28	Jafar Khodagholizadeh	Farhangian University, Tehran, Iran.

Aschenbach effect: The Orbital Velocity of Spinning Particles around the Rotating Blackholes

The orbital velocity profile around the Kerr blackholes has a non-monotonic radial behaviour in the Locally Non-rotating Frames (LNRF). Using Mathisson-Papapetrou-Dixon equation for a massive spinning particle, again this maximum-minimum feature has been shown by considering the linear spin approximation. In addition to the black-holes spin, the absolute value of particle's spin also plays an important role in Aschenbach effect. We can find the relation betwwen the particle's spin and spin of blackhole.Therefore this effect can be used to constrain the spin of particles around the rotating blackholes.

PB29	Rajesh Kumar Dubey	Lovely Professional University in Astronomy and Astrophysics

Gravitational Waves and Galaxy Collisions

At the time when number of events of galaxy collisions are being observed, the prediction and production of gravitational waves is obvious now. The events of gravitational waves production can now be observed. We now knew the future events of galaxy collisions which are going to take place in coming billions of years. In this regard the significance of gravitational waves becomes more important.

PB30	Takuma Kajihara	Department of Physics, Rikkyo University

Newton-V experiment: Test of gravitational inverse square law at a micrometer scale

According to the large dimension model, a deviation from the Newtonian inverse square law is expected at sub-millimeter scale. We have developed an experimental method using a wire cantilever with a digital image analysis system, aiming to test Newton's gravitational law in a laboratory experiment. We will report the status of the experiment at the micrometer scale using the wire cantilever.