

研究室名
17-2-1 観測実験宇宙物理研究室
最近の研究課題とその取り組みの概要
2016 年の LIGO による重力波の初検出によって、天体现象及びその周辺のエネルギー情報を持つ電磁波、素過程の情報を持つニュートリノなどの素粒子の観測に加えて、天体现象の起こる起点の情報を持つ時空間の変 動を直接観測することが可能になった。まさに重力波天文学が始まったばかりであり、これから KAGRA など世界の重力波望遠鏡がネットワークを構築して観測を行い、重力波天文学の確立が進んでいく。 当研究室は観測を基礎に置いて、宇宙の生い立ちや時空間の幾何学、宇宙で起きる様々な現象を実証的に解明していくことを目指していく。そのために、宇宙で支配的な力である重力の情報を直接運ぶ重力波の観測を中心に、電磁波、ニュートリノといった観測手段を連携するマルチメッセンジャー観測を進めていく。それとともに、重力波望遠鏡の診断システムの構築、将来に向けた重力波望遠鏡の高感度化についての研究を進めていく。 また、LIGO－Virgo－KAGRA 国際重力波観測コミュニティの中では、バースト性重力波観測グループにおいて、KAGRA からのチェアとしてプロジェクトのマネージメントを行っている。 魚群やムクドリなどの集団飛行にみられる高度に組織化された群行動に現れる知能―群知能―について、そのアルゴリズムや最適性を生態観測から研究し、その成果を重力波天文学や社会科学に応用していく研究も進めている。 キーワード：重力波、重力理論、重力波望遠鏡、干渉計診断、KAGRA、マルチバース、機械学習、群知能、宇宙幾何学
研究室の構成員
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2021 年度の大学院生および卒論生の人数と研究テーマ
M1：2 名 M2：2 名 4 年次生：4 名 研究テーマ 大学院生 ・メーザー源の電波観測による銀河系からの重力波放出量の制限 ・多様な生態の見せる群知能から着想を得たコロナ禍における社会・医療問題の解決 卒論生 ・「スパースモデリングを用いた重力波信号の雑音除去」 ・「ボイドモデルを用いた群知能のシミュレーション」 ・「サハの方程式から求める核統計平衡について」

教員の担当科目
端山 和大：(学部) 熱力学 I、熱力学 II、物理学 A、物理学 B、物理科学研究 I、物理科学研究 II、卒業論文 (大学院) 物理情報計測実験、物理情報計測講究、量子物理学特論、解析力学（工学研究科） 大槻 かおり：(学部) 物理科学実験 I、物理科学実験 II、物理学基礎ゼミナール、国際化と日本
教員の所属学会
端山 和大：日本物理学会、日本天文学会、International Astronomical Union(IAU)、宇宙線研究者会議（CRC） 大槻 かおり：日本天文学会、日本物理学会、International Astronomical Union(IAU)
最近 5 年間の学術論文
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最近 5 年間の学術著書

該当なし

最近 5 年間の学術国際会議での発表

Gushima, Y., Hayama, K.
Model-Independent test of Scalar-Tensor gravity theory by reconstructing scalar mode of GW170817
Sixteenth Marcel Grossmann Meeting (2021)

Kukihara, M., Hayama, K.
Probing multiverse using gravitational wave observations
Sixteenth Marcel Grossmann Meeting (2021)

Gushima, Y., Hayama, K.
Model-Independent test of Scalar-Tensor gravity theory by reconstructing scalar mode of GW170817
Gravitational Wave Physics and Astronomy workshop 2021(GWPAW 2021) Hannover,

Germany, (2021)
Kukihara, M., Hayama, K. Probing multiverse using gravitational wave observations Gravitational Wave Physics and Astronomy workshop 2021(GWPAW 2021) Hannover, Germany, (2021)
最近 5 年間の代表者としての学外資金導入実績
2019～2021年度 科研費基盤C” 即時重力波アラートに向けた環境雑音除去システムの構築”
最近 5 年間の代表者としての学内資金導入実績
2019年度高度化推進タイプI
最近 5 年間の学会等学術団体における役職など
端山和大LIGO–Virgo–KAGRA国際重力波観測コミュニティでのバースト性重力波観測グループチェア
最近 5 年間の一般向け論文と著書、行政報告書など
最近 5 年間の一般（非学術）集会での発表論文
最近 5 年間の学術団体以外の団体での啓蒙活動や社会貢献活動とその役職など
端山和大「宇宙の音を聞く天文学ー重力波天文学ーの始まり」天文教育普及研究会・2018年度九州支部会
端山和大、大槻かおり：世界一行きたい科学広場 in ふくおか 2018 における、宇宙物理学のブースを開き、宇宙物理学に関するビデオを使って研究の紹介を行った。2018 年 8 月 12 日福岡国際センター