channel data

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We demonstrate that a deep learning classifier that only uses to gravitational wave (GW) detectors auxiliary channel data can distinguish various types of non-Gaussian noise transients (glitches) with significant accuracy, i.e., $\gtrsim$ 80%. The classifier is implemented using the multi-scale neural networks (MSNN) with PyTorch. The glitches appearing in the GW strain data have been one of the main obstacles that degrade the sensitivity of the gravitational detectors, consequently hindering the detection and parameterization of the GW signals. Numerous efforts have been devoted to tracking down their origins and to mitigating them. However, there remain many glitches of which origins are not unveiled. We apply the MSNN classifier to the auxiliary channel data corresponding to publicly available GravitySpy glitch samples of LIGO O1 run without using GW strain data. Investigation of the auxiliary channel data of the segments that coincide to the glitches in the GW strain channel is particularly useful for finding the noise sources, because they record physical and environmental conditions and the status of each part of the detector. By only using the auxiliary channel data, this classifier can provide us with the independent view on the data quality and potentially gives us hints to the origins of the glitches, when using the explainable AI technique such as Layer-wise Relevance Propagation or GradCAM.

[포 AT-02] Development progress in the Maunakea Spectroscopic Explorer's Exposure Time Calculator (MSE-ETC)

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MSE (Maunakea Spectroscopic Explorer)는 11.25m 구경의 망원경과 최대 4,000 개의 천체를 한 번에 관측할 수 있는 분광기를 통해 다천체 분광학 연구를 이끌 차세대 관측기기이다. 경희대학교는 망원경에 장착되는 다천체 분광기의 성능 요구사항을 바탕으로 노출 시간 소프트웨어 ETC (Exposure Time Calculator)를 개발하고 있다. ETC는 대기에 의한 연속선 소광, 방출선과 흡수선, 망원경 및 광학 기기의 투과율, 검출기의 암전류와 읽기 잡음을 바탕으로 신호 대 잡음비 S/N (Signal to Noise)을 도출하여 천체를 분광 관측하기 위한 적절한 노출 시간을 계산한다. MSE-ETC는 저분산 LR (Low Resolution, R=3,000), 중분산 MR (Moderate Resolution, R =6,000) 및 고분산 HR (High Resolution, R=40,000)의 관측 모드로 가시광선과 근적외선 영역의 S/N과 파장, 그리고 S/N과 AB등급 간의 상관관계를 보여준다. 본 포스터에서는 개발 중인 MSE-ETC 프로그램의 구조와 작동 알고리즘 및 사용 예를 발표한다.

[포 AT-03] Confocal off-axis optical system with freeform mirror, application to Photon Simulator (PhoSim)

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MESSIER is a science satellite project to observe the Low Surface Brightness (LSB) sky at UV and optical wavelengths. The wide-field, optical system of MESSIER is optimized minimizing optical aberrations through the use of a Linear Astigmatism Free - Three Mirror System (LAF-TMS) combined with freeform mirrors.

One of the key factors in observations of the LSB is the shape and spatial variability of the Point