



Contribution ID: 176

Type: **Parallel talk**

## RoBiTE: A Foundation Model for Irregular and Sparse Time-Series Analysis

Analyzing irregular and sparse time-series is a widespread problem in fundamental physics, astronomy, climate science and many other fields. This talk presents the Rotary Bidirectional Transformer Encoder (RoBiTE), a novel Transformer-based architecture for multi-dimensional irregular time-series and sparse data, designed as a foundation model for general time-series interpolation and object classification. Our method consists of a pre-training phase, where the model is trained on interpolation, and a subsequent fine-tuning phase where the learned representation is adapted to down-stream tasks, such as classification. We highlight the performance of our algorithm on a wide variety of physics datasets including the Photometric LSST Astronomical Time-Series Classification Challenge (PLAsTiCC) and simulated recoil events in a liquid xenon time projection chamber for direct dark matter detection. We compare our method to other popular models for irregular time-series such as S5 and RoFormer, showing that our approach can out-compete the current state-of-the-art.

### AI keywords

transformer, irregular time-series, sparse data

**Primary author:** ZIVANOVIC, Uros (University of Trieste)

**Co-authors:** SCAFFIDI, Andre (SISSA); DE LOS RIOS, Martin (SISSA); TROTTA, Roberto (SISSA, Italy)

**Presenter:** ZIVANOVIC, Uros (University of Trieste)

**Track Classification:** Inference & Uncertainty