



## 第102回 (2025年度第1回) 極限宇宙研究拠点セミナー (the 1st Core-U Seminar in FY2025)

## 日時:2025年04月02日(水)11:00 -12:00 Date/Time: Apr.02 (Wed), 2025, 10:00-11:00 形式:理学部 C212 Format: Faculty of Science, C212 講師 (Speaker): Dr. K.H. YEUNG (ICRR, Tokyo Univ.) (東京大学宇宙線研究所)

Title

## A mechanism-independent methodology for modelling γray phaseograms of pulsars in the framework of northsouth symmetry

## Abstract

Fermi-LAT observations revealed that each GeV pulse profile of the Crab, Geminga and Vela pulsars consists of two pulses (P1 & P2) and a "Bridge" between them. There is clearly a "bump" at the Bridge phase of Vela's pulse profiles, that could also be regarded as the third pulse (P3). On the other hand, the Crab's & Geminga's bridges relatively resemble a "valley floor". Despite such an apparent difference, it is interesting to investigate whether their bridge emissions are still within the same general picture as Vela's. Assuming the north-south symmetry, we would expect the fourth component (Bridge2/P4) to exist as well. However, such a hypothetical Bridge2/P4 is not intuitively identified on gamma-ray phaseograms of the Crab, Geminga and Vela pulsars. One possibility is that Bridge2/P4 is mixed up with and indistinguishable from other components, while another possibility is that our line of sight disfavours the detection of Bridge2/P4. Our prototypical toy model is free of assumptions on emission regions or radiation mechanisms. Instead, it assumes a north-south symmetric configuration and one circularly symmetric beam per hemisphere, while taking into account the emission geometry, Doppler shifts and time delays, as well as the spatial and spectral distributions of beams' intensities. Despite the qualitative match between data and model predictions, the systematic evaluations prompt us to outline some potential improvements for our toy model. Notably, for the Crab pulsar, we found a preliminary qualitative correlation between our model predictions and the IXPE results on X-ray polarization.

本セミナーは共同セミナー(理工学融合共同演習)の対象です。共同セミナーの出欠確認は対面参加 者のみとし,出欠はセミナー終了時にC212で取ります。サインを記入する書類を持参して下さい。 「広島大学 極限宇宙研究拠点(Core-U)セミナー」世話人 両角卓也,山口頼人,水野恒史 問合せ先: e-mail: mizuno@astro.hiroshima-u.ac.jp