

## External Collaborator MOU — The Marengo Team

### (1) Proposed contribution to a ZTF Key Project

The main focus of the proposed collaboration is to use RR Lyrae as a probe of Galactic structure. Our goal is to create a model that relates features in the RR Lyrae light curves, derived from ZTF data, to their metallicity. There are now sufficient data from ZTF to fit light curves with a Fourier series and extract the  $\phi_{31}$  parameter (essentially the phase of the minimum in the light curve). This parameter is believed to be correlated with the metallicity of the RR Lyrae. Once this is completed we would have a significant sample of RR Lyrae from which to probe the Galactic structure. In order to estimate these light-curve-based metallicities, we need an adequate calibration sample with well measured metallicities.

The Fabrizio team collected the largest sample of RR Lyrae with spectroscopic metallicity as described in their recent paper.

Fabrizio, M., Bono, G., Braga, V. F., Magurno, D., Marinoni, S., Marrese, P. M., Ferraro, I., Fiorentino, G., Giuffrida, G., Iannicola, G., Monelli, M., Altavilla, G., Chaboyer, B., Dall’Ora, M., Gilligan, C. K., Layden, A., Marengo, M., Nonino, M., Preston, G. W., Sesar, B., Sneden, C., Valenti, E., Thévenin, F., Zoccali, E.. [“On the Use of Field RR Lyrae as Galactic Probes. I. The Oosterhoff Dichotomy Based on Fundamental Variables”](#), The Astrophysical Journal 882, 169 (2019).

Their metallicity catalog is, however not public. The Marengo team are interested in a collaboration with our team and sharing their catalog. In return they would like to be added as co-authors to any resulting publications.

We will make the resulting metallicity catalog available to the ZTF collaboration.

Note: Within the ZTF collaboration, Prof. Chow-Choong Ngeow from NCU is leading a group working on “Calibration of RR Lyrae period-luminosity relations using ZTF observed globular clusters”. There are not any conflicts between Prof. Ngeow work and our project that we know about.

### (2) List all personnel

- 1- Massimo Marengo
- 2- Joseph Mullen
- 3- Jillian Neeley
- 4- Giuseppe Bono
- 5- Vittorio Braga
- 6- Massimo Dall’Ora
- 7- Giuliana Fiorentino

### **(3) Observing resources**

NA.

### **(4) Points of contact (POC) in the Partnership**

The chief points of contact will be Zeljko Ivezic and Zach Golkhou.

### **(5) Proposed publications**

The expected publications are as follows:

- RR Lyrae discovery in ZTF alert stream and uncovering metallicity — light curve relation
- A general catalog of variable stars for ZTF alerts DB (including light curve features)

### **(6) Required access to ZTF data**

We do not share any ZTF data (i.e., ZTF light curves) with the external collaborators. We only share coordinates and `phi_31` information for a list of RR Lyrae found in the ZTF data set.