Identification of RR Lyrae stars in the Javalambre Photometric Local Universe Survey.

Héctor Vázquez Ramió[1], David Cristóbal-Hornillos[1], Alessandro Ederoclite[1,2], Devin Whitten[3], Vinicius Placco[3] and the J-PLUS Team

[1] Centro de Estudios de Física del Cosmos de Aragón, Teruel, Spain - Unidad Asociada CEFCA-IAA, CSIC, Spain
[2] Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Universidade de São Paulo, Brazil
[3] Department of Physics and JINA Center for the Evolution of the Elements, University of Notre Dame, Notre Dame, IN 46556, USA

Abstract

The large and indiscriminate area Javalambre Photometric Local Universe Survey (J-PLUS) will observe, together with the survey's depth, mag_{AB}=22 in the broad bands, makes it very convenient for deriving properties of the Galactic halo structure. Among the stars than can be used for that purpose, RR Lyrae pulsating stars are of outstanding importance for several reasons (see e.g. Sarajedini 2011): i) they are ubiquitous species in our Galaxy, so they can be found distributed virtually everywhere without being linked to any particular Galactic component; ii) they are relatively bright ($M_V \sim 0.6$ for mean halo metallicity), so they are easily detectable up to a few hundred kpc from us; iii) their pulsation periods obey a period-luminosity-metallicity relation that makes them standard candles, becoming very useful to constraint distances; iv) they are stars older than 10 Gyr, so they are fair tracers of the Milky Way old component. J-PLUS will provide the SED of a unprecedented amount of RR Lyrae stars.

Here, the first preliminary mandatory step towards the achievement of those goals is addressed: the development of a method allowing the identification of RR Lyrae star candidates. The stellar locus of the RR Lyraes at different color-color spaces is inspected in order to isolate highly pure and complete candidate samples. A machine-learning technique is applyied, employing *Gaia* DR2 identifications (which are complete for *Gaia*'s $G \lesssim 17$) for building the training and test sets. The resulting completeness is 85% with a purity of 77%, obtaining $\sim 5,000$ RR Lyrae stars candidates with $17.0 \leq r \leq 19$ in J-PLUS DR1.

That result is using J-PLUS colors only. A significant improvement is expected when including variability information, e.g. from the comparison of J-PLUS photometry with other archives. This methodology will be applied to the whole survey data. (See poster).