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NEW HOT PAPERS - 2009

July 2009

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Paola Marigo talks with *ScienceWatch.com* and answers a few questions about this month's New Hot Paper in the field of Space Science.

Article Title: Evolution of asymptotic giant branch stars - II. Optical to far-infrared isochrones with improved TP-AGB models
Authors: Marigo, P;Girardi, L;Bressan, A;Groenewegen, MAT;Silva, L; Granato, GL
Journal: ASTRON ASTROPHYS, Volume: 482, Issue: 3, Page: 883-905, Year: MAY 2008
* Univ Padua, Dipartimento Astron, Vicolo Osservatorio 2, I-35122 Padua, Italy.
* Univ Padua, Dipartimento Astron, I-35122 Padua, Italy.
(addresses have been truncated)

SW: Why do you think your paper is highly cited?

There are two basic reasons. First, we provide theoretical photometric data useful for the interpretation of a large variety of astronomical data. Especially important is the inclusion of the mid-infrared spectral window, which probes new physics and has become more widely accessible by new satellites such as Spitzer and AKARI.

Second, our study is mainly focused on the so-called asymptotic giant branch (AGB) phase, a fast stellar evolutionary phase, whose paramount importance for the spectrophotometric and chemical evolution of galaxies has only recently been recognized.

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

The paper fits together the state-of-the-art knowledge of different astrophysical fields, namely: theory of stellar evolution and nucleosynthesis, mass loss in stars, dust formation, radiative transfer in dusty environments, etc. Each co-author of the paper has effectively contributed to this study, bringing individual expertise to bear in a particular area.

"Our models may help many other astronomers to optimize the use of the telescope time, hence leading to a more rational exploitation of very expensive

SW: Would you summarize the significance of your paper in layman's terms?

We supply other researchers with the capability of predicting the number and luminosities of the stars that are expected to be observed in different astrophysical environments—star clusters, near and far galaxies—at any frequency interval of the electromagnetic spectrum, ranging from the optical to the far-infrared. From directly comparing these predictions with the data acquired through the telescopes, one can then derive precious information about the history of these distant objects.

SW: How did you become involved in this research, and were there any problems along the way?

resources."

This line of research is the natural continuation of a long-term effort aimed at providing reliable models for AGB stars, originally started during my Ph.D. course carried out at the Department of Astronomy of the University of Padua. The main problems I encountered along the way were the small budgets allocated to the research, which in turn has implied limited human resources to be actively involved in the work.

SW: Where do you see your research leading in the future?

The follow-up of this research will be primarily directed to 1) improve the modelling of the dust properties, including the nucleation of the grains and their opacity characteristics; 2) predicting detailed chemical yields from AGB stars, which are among the most important producers of the chemical elements in the Universe, including our solar-system; 3) to calibrate the fine details of our AGB stellar models on the basis of the large stellar catalogs that are nowadays available for both the Milky Way and external galaxies.

SW: Do you foresee any social or political implications for your research?

Our models may help many other astronomers to optimize the use of their telescope time, hence leading to a more rational exploitation of very expensive resources.

Paola Marigo, Ph.D.
Dipartimento di Astronomia
Universita' di Padova
Padova, Italy
Web

KEYWORDS: LARGE-MAGELLANIC-CLOUD; LONG-PERIOD VARIABLES; MASS-LOSS RATES; POPULATION SYNTHESIS MODELS; SINGLE STELLAR POPULATIONS; DUST CONDENSATION SEQUENCE; COLOR-MAGNITUDE DIAGRAMS; SPITZER-SPACE-TELESCOPE; ACTIVE GALACTIC NUCLEI; DA WHITE-DWARFS.

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