Abstracts of Papers and Posters Presented at the 99th Spring Meeting of the AAVSO, Held in Mendoza, Argentina, April 15–18, 2010

Introduction to Variable Star Astronomy

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Abstract In this introduction we explain what a variable star is and what are its main characteristics. Variable star classification is described with images and light curves of each type, stressing that variability is—most of the time—an evolutionary stage in a star's life. A general overview of the current status of this field of study and the always important role of the amateur astronomer—even in the automated surveys era—is presented. Finally, we take a first look at the visual observation method and give some exercises to be made during observing nights.

Current Hot Variable Star Topics

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Abstract Transient events happen almost daily, many being novae, supernovae and other outbursting stars. In addition, several known variable stars are undergoing unusual events. This paper will highlight a number of these objects and show how you can observe them.

History of Variable Stars

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Abstract Within the field of history of variable stars, we have focused on the history of Cepheid stars. Using graphics, we will describe historical evolutive behavior and its characteristics stressing on the Period Luminosity relation , and in consequence the importance of the research made by Miss Leavitt during the 20th century. We also will present and introduction to Fuzzy logic. For that

purpose, we will show examples of its application in different disciplines such as biology, industrial processes, and electronics. In this work we will leave open the possibility of applying this mathematical concept in the field of variable star classification, when the observer facing the traditional models meets the dilemma of decision.

Activities of the SEV/LIADA

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Abstract For the Ligo de Asronomia Iberoamericana (LIADA) 2009 was a busy year, and discussions were initiated for the creation of a Variable Star Section (la Seción de Estrellas Variables, SEV). In June 2009 SEV was formed, which is the "Variable Star Section, League of IberoAmerican Astronomy." The growth was exponential, and observers from various countries began reporting their work. The SEV has produced a work program, developed it further, and is armed with a Web page, which shows all the observations reported. The courses on variable stars, through ON LINE, have had extraordinary success, thus fulfilling the SEV objectives for observers: dissemination of data, education, and technical and scientific training.

Mira Observations by José Brazilício

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Abstract José Brazilício de Souza was musician, cosmography professor, and an amateur astronomer who lived in Florianópolis, Brazil. He made several visual observations: comets, solar, eclipses, planetary, and moon observations between 1882 and 1909. Among his data we found some Mira (o Cet) estimates. This paper shows his Mira records and a phased light curve using elements for 1881.

King Charles' Star: A Multidisciplinary Approach to Dating Cassiopeiae A

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Abstract Few astronomical phenomena have been as studied as the supernova known as Cassiopeiae A. Widely believed to have occurred in the latter half of the seventeenth century, it is also thought to have gone unrecorded. This paper will argue that Cas A did not go unobserved, but in fact was seen in Britain on May 29, 1630, and coincided with the birth of the future King Charles II of Great Britain. This "noon-day star" is an important feature of Stuart/Restoration propaganda, the significance of which has been widely acknowledged by historians and literary experts. The argument here, however, is that in addition the historical accounts provide credible evidence for a genuine astronomical event, the nature of which must be explained. Combining documentary analysis with an overview of the current scientific thinking on dating supernovae, the authors put forward their case for why Charles' star should be recognized as a sighting of Cas A. Finally, it will be argued that a collaborative approach between the humanities and the sciences can be a valuable tool, not just in furthering our understanding of Cas A, but in the dating of supernovae in general.

Near-infrared Observations of Cepheid Variables in the Large Magellanic Cloud

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Abstract I present preliminary results of near-infrared observations of Cepheid variables in the Large Magellanic Cloud, obtained with the CPAPIR camera at the Cerro Tololo 1.5-m telescope.

The observations were carried out with two goals: (a) to better characterize the Cepheid Period-Luminosity (P-L) relation at near-infrared wavelengths, especially for periods below 10 days; (b) to determine if the P-L relations are linear or non-linear in these bandpasses.

Several analyses of OGLE-II observations of Cepheid variables in the Large Magellanic Cloud have detected a non-linearity or "break" in the slope of the optical (*V* and *I*) P-L relations at a period around 10 days. Theoretical models indicate the non-linearity may be due to changes in the interaction of the hydrogen ionization front and the stellar photosphere as a function of global stellar parameters, such as mass and metal abundance. Models predict that the non-linearity becomes most pronounced at abundances similar to that of the Large Magellanic Cloud.

In this talk, I will show representative light curves for a small subset of our nearly 1,200 Cepheid variables and I will present preliminary PL relations in the *J* and *K* bands as well as color-magnitude diagrams for Cepheid variables and field stars.

Minima of Some Eclipsing Binaries

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Abstract This paper shows a list containing fourteen southern eclipsing binaries, not much observed, and sixty-two dates of minima. 394 visual observations were computed, considering that 86% of them were made by Alves and 14% by Amorim. The main goal is update the elements for each star, providing useful guide to future visual, photoelectric and CCD observations. All the dates were obtained by the bi-sectioned chords. The chosen binaries are: SY Ara, LU Ara, GW Car, SS Cen, BD Cen, T Cir, TT Cru, DT Lup, FK Lup, NP Pav, RV Tel, RR TrA, V Tuc, and RR Vel. Phased light curves of these binaries are available.

New Variable Stars in the Southern Cross

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Abstract With a photographic survey, our program started in 1994 and gathering data from that time we discovered the variability of a star in the constellation Crux. This is the result of a digitalization program of photographs taken in Cristo Rey Observatory, started in 1994 and with CCD cameras. The data show that IRAS12521-6034 is a variable star. The survey has been continued by members of the Asociación Santafesina de Astronomia, and then we have found other stars suspected to be variables.

Didactics on Education in Astronomy

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Abstract This work is not intended as a "how to," guide or methodology for teaching astronomy. Rather, it is a compilation of experiences, a summary of those activities that have helped me in my task of popularizing science. In popularizing science, because I enjoy doing it so much, something special is transmitted that helps us reach those who try to spread the taste of the science we love.

Starting Research Projects at Buenaventura Suárez Observatory in San Luis Province (poster)

Eric González
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Abstract The Buenaventura Suárez Observatory has several small telescopes acquired during the International Year of Astronomy (IYA2009) for public education. A brief description of the available equipment is presented, along with three research and public education programs to be developed starting on 2010.

New Equipment for Variable Star Research at the Instituto Copernico Observatory

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Abstract New equipment was recently installed and is undergoing calibration at the Instituto Copernico's Observatory, in Rama Caéda, south of Mendoza. We will show briefly this equipment ant the observatory's scientific and education goals.

Observational Techniques Workshop

Visual Observing Techniques

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Abstract Obtaining high precision in visual observing takes more than just knowing the fractional method of brightness estimates. Different circumstances play an important—and even determining—role at the moment you make an estimate. This presentation lists several factors that need to be taken into account while making an observation: color of variable star and comparison stars, their brightnesses, sky background brightness, individual color sensitivity, right choice of the comparison stars and their position with respect to the variable are some of them. Different problems the observer may face with their respective possible solutions are also listed, along

with some advice to improve the observer's skills, supported by examples of the goals that can be achieved if you struggle to get the most out of your capabilities.

An Introduction to CCD Photometry of Variable Stars

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Abstract The aim of this presentation is introducing to the audience the use of the CCD camera for more than beautiful images, producing science with its own instruments. It details techniques for acquiring images in order to perform photometry on them.

Advanced CCD Observing Techniques

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Abstract After you have learned the basics of using your CCD camera, you still need to learn the techniques necessary for quality photometry. This paper covers the basic essentials: choosing the correct aperture size, improving the precision of your measures, learning about signal/noise, defects like saturation, clouds and scintillation, beginning differential photometry, paying attention to the time of an observation, and transformation. Practical examples are given throughout.

Data Mining in Astronomy Workshop

An Introduction to Data Mining

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Abstract I will give a brief overview of what data mining is and the many data sources that are available to researchers. I will also show examples of data mining papers and discuss some of the techniques used in data mining research.

Tips to Succeed in Using the ASAS-3 Database

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Abstract The ASAS-3 database—publicly available through the internet—allows us to obtain observations of millions of stars in the Southern hemisphere (up to Declination +28°) between V-magnitude 6 and 14, but its use is not straightforward. There are things you need to know to avoid jumping to wrong conclusions about the data. There are things you need to take into account to choose which of the data in the website are best and which need to be avoided. Some tips to get the most out of this amazing database are given in this talk.

Mining for Rare Variable Stars in Photometric Databases

Doug Welch
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Abstract In this talk, I will provide examples of how to hunt rare but astrophysically-interesting stars such as Cepheids in eclipsing systems, double-mode Cepheids, and R CrB stars in the MACHO and NSVS databases. Some surveys are "mined out" for such systems now, but not all. Existing exoplanet surveys and future photometric database releases will ensure a healthy supply of new variable star "ore" including good prospects of finding new "Rosetta Stone" systems.

Data Reduction Workshop

Uncertainty Analysis in Photometric Observations

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Abstract Uncertainty analysis is an important part of observing. We take a brief look at formal uncertainty analysis for any observation set. We then address sources of uncertainty in photometric observations and discuss practical methods for applying uncertainty analysis to common photometric data sets.

Using the AAVSO International Database

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Abstract The AAVSO International Database (AID) contains over eighteen million brightness estimates of thousands of variable stars, almost all made by amateur astronomers. We cover how these observations are submitted, the pipeline that all observations pass through, how observations can be retrieved from the database, and the basic tools for data visualization: the light curve generator and

data download, VSX, and Seqplot. Many of the flags, such as validation, are described. Analysis tools such as VStar are covered. References regarding other photometric and imaging datasets are given.

How to Use MAXIM DL for CCD Image Reduction

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Abstract This goal of this talk is to present a standard way of performing CCD image calibration and reduction using MAXIM DL software. The presentation consists of two parts: the first, in which the steps to follow for image calibration are introduced, and the second, where it is explained how to perform the photometry using, in this case, a reference star to obtain magnitudes as a function of photon counts instead of determining it differentially.

Period Search Techniques in Variable Stars

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Abstract There are several techniques of searching for periods in oscillatory phenomena like light variation in stars. All of them are focused in the study of light curves. In this talk we will introduce a new tool available though the AAVSO for the visualization and analysis of light curves, the software VSTAR.

An Introduction to PHOTOMETRICA

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Abstract PHOTOMETRICA is a web-based photometry tool that is part of the AAVSOnet system. I will demonstrate how to use PHOTOMETRICA to do photometric analyses of time series data to search for variable stars, create light curves, and generate reports suitable for submission to the AAVSO.