2008Obs...128..433S

is far better in all respects than this volume. As for the accompanying software, it is no match for the several good planetarium programs currently available. In short, I would not choose this book, or software, to guide my deep-sky observing. — ALAN LONGSTAFF.

THESIS ABSTRACTS

AN OBSERVATIONAL STUDY OF POST-ASYMPTOTIC-GIANT-BRANCH STARS

By Timur Şahin

In this thesis, we present LTE model-atmosphere analyses of a group of early B-type post-asymptotic-giant-branch (pAGB) stars. With initial masses $\leqslant 9\,M_{\odot}$, post-AGB stars form an important group of evolved stars and provide a unique opportunity to study stellar evolution almost on a human time-scale. Post-AGB stars have spectral types ranging from K to B and luminosities between 10^3 and $10^4\,L_{\odot}$. These objects ended their asymptotic-giant-branch (AGB) evolution phase with a period of strong mass loss ($10^{-7} - 10^{-4}\,M_{\odot}$ yr^{-1}) and have been evolving from cooler to hotter temperatures at almost constant luminosity on a timescale of $\sim 10^4$ yr. B-type pAGB stars span a wide range in effective temperature (10 000 – 30 000 K). Their expected surface gravities ($\log g$) and effective temperatures ($T_{\rm eff}$) coincide with those of B stars evolving from the main sequence. Therefore systematic observational analyses are required to distinguish these two groups. Furthermore, post-AGB stars may be divided into four distinct groups based on their chemical composition. In this thesis, groups I and II represent post-AGB stars which are very metal deficient with C/O $\approx$ 1, and metal poor with C/O $<$ 1, when compared with the Sun, respectively. The question is whether hot pAGB stars belong to any of those four groups. Three further objectives included: (*i*) to discover whether post-AGB stars have helium-normal or helium-rich photospheres; (*ii*) the detection and measurement of *s*-process element abundances (*e.g.*, Sr, Y, Ba, Hf); and (*iii*) to determine whether they show any anomaly in phosphorus abundance such as that seen in the extreme helium (EHe) stars.

High-resolution échelle spectra of several post-AGB stars were obtained at the *AAT* in 1999 and 2005 in order to study chemical composition, rotation velocities, and other fundamental properties. Échelle spectra present many difficulties for data reduction, including the problems of order rectification and merging. To address these problems we developed an échelle-spectrum-reduction package, known as TIGER. These spectra were analyzed using model atmospheres and synthetic spectra computed with the Armagh LTE stellar-atmospheres software. The semi-automated spectral-fitting package SFIT was used to measure the stellar surface parameters and composition.

The results show that the programme stars have $T_{\rm eff}$ in the range 15 000 – 25 000 K and $\log g$ in the range $2\cdot5 - 3\cdot0$. In addition to being metal-poor stars, they show mostly C/O $<$ 1. Several of our programme stars, namely HD 119608, LSS 4331, LSS 5112, and LB 3116 confirm this. The majority of hot post-AGB stars can be identified with the group II, metal-poor and C-deficient post-AGB

© The Observatory • Provided by the NASA Astrophysics Data System

2008Obs...128..433S

stars. The model-atmosphere parameters, LTE element abundances, and estimated distance, obtained here support the idea that the programme stars are true post-AGB stars.

We detected helium enrichment in the post-AGB stars Hen 3–1428 and LSS 4331. We did not detect any evidence of *s*-process elements, primarily because of the high effective temperatures of our targets. Our results do not show overabundance in phosphorus for any hot pAGB stars. Since we used the same atomic data and methods, we conclude that the enhancement of phosphorus previously found in some EHe stars is real.

We studied stellar-wind signatures for the post-AGB star LSIV−12 111. Emission-line equivalent widths for Balmer lines show changes between two different epochs. Hen 3–1428 and LSIV−12 111 show blue-shifted absorption lines. A stellar wind is clearly present in both stars.

We compared the variability of a group of post-AGB and a group of EHe stars using archival photometry. We did not detect any variability in EHe stars. We detected variability in five post-AGB stars. Large photometric variations in HR 4049, HD 213985, and HD 52961 appear to be related to the binary period. — *The Queen's University of Belfast; accepted 2008 March.*

A Radio Study of the Starburst Galaxy M 82

By Danielle Fenech

Radio observations of the prototypical starburst galaxy, M 82, are presented. These provide the most sensitive, high-resolution observations of the discrete supernova remnants and H II regions in the central starburst to date. In addition, the first ever Global VLBI and *MERLIN* data combination has produced images of the detailed structure of the compact sources at 1·6 GHz.

MERLIN 5-GHz observations made over a period of 8 days have provided extremely sensitive images of the discrete sources within the M 82 starburst with an r.m.s. noise level of ~ 17 μJy beam^{-1}. In total 55 of the sources within M82 have been imaged with resolutions of 35–50 milli-arcseconds. This has enabled direct comparison with previous *MERLIN* 5-GHz observations from 1992. As a result, expansion velocities have been measured for ten supernova remnants with values ranging from 1500 to 10500 km s^{-1}.

Global VLBI observations at a frequency of 1·6 GHz were performed using sixteen antennae across Europe and America. The combination of these observations with *MERLIN* 1·6-GHz data has provided the first ever Global VLBI and *MERLIN* combined image of M 82 at this frequency. These data have been used to study the supernova remnants and H II regions using resolutions ranging from 20–130 milli-arcseconds.

Both the *MERLIN* 5-GHz and combined Global VLBI and *MERLIN* 1·6-GHz observations have been used to study the supernova-remnant population, including measurement of the supernova rate and the star-formation rate within M 82.

The 1·6-GHz Global VLBI data form the most recent epoch of observations used to study the evolution of the most compact sources within M 82. Comparison of this and previous epochs covering a 19-year timeline has enabled confirmation of the expansion of SNR 43·31+59·2, with a velocity of ~ 8000 km s^{-1}, and study of the source 41·95+57·5, showing it to be unique of the sources observed within that galaxy. — *University of Manchester; accepted 2007 December.*

© The Observatory • Provided by the NASA Astrophysics Data System