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13 JANUARY 1990
SATURDAY MORNING

Session 66: Invited Talk
Oral session, 8:30–9:20 am, Salon III/IV

Session 67: Low Luminosity and Degenerate Stars
Display Session, Grand Ballroom

67.01
First Evidence for Particle Beams in a Stellar Flare
S. H. Saar (CFA), P. Martens (CFA), J. Knuvelin (U. Helsinki)

We present broadband linear polarization measurements of the active K5 flare star, BD +26° 730, which show a rapid change in polarization amplitude and direction over a two hour period. After considering and discarding several alternatives, we conclude that impact polarization resulting from flare-generated particle beams is the most likely cause of the observed polarization variations. This result represents the first evidence for particle beams in a star other than the Sun. We estimate the particle energy fluxes required to power the observed polarization changes. From the non-flare polarization level and simple models, we estimate a lower limit to the fractional area coverage of inhomogeneous magnetic regions on the stellar surface. We compare our results with solar flares and suggest further observations.

66.01
Complex Structures in the Pisces-Perseus Supercluster
M.P. Haynes (Cornell and NAIC)

About ten years ago, R. Giovanelli and I began a survey at Arecibo of the 21 cm HI line emission from spiral galaxies in the region of the sky containing what was then hypothesized to be a large supercluster of galaxies extending from the Pisces cluster to A262 and east to Perseus. The Arecibo telescope makes an excellent redshift machine because it is fast, measures radial velocities with high precision, and yields additional information such as the HI mass and rotational velocity. The basic shortcoming of a radio survey is that only morphologies 50a and later are likely to be detected in the HI line, and complementary optical observations of the E and S0 populations are necessary to complete the redshift survey. The survey now includes 21 cm line observations made with the Arecibo 305m and the late Green Bank 91m telescopes and optical redshifts obtained with the 2.4m Hiltner telescope at the McDonald Observatory. Our ultimate goal is to complete the sample to m = 15.7. Within our abilities to estimate distances from redshifts, the acquisition of the third dimension permits a study of the structure within the volume under study, structure which turns out to be quite complex indeed. The main ridge of the supercluster is easily visible in the sky distribution of galaxies in the Wilson and Zwicky Catalogs. Its prominence is enhanced by its linear structure (at least 45h^-1 Mpc, with an axial ratio of about ten to one), small inclination to the line of sight (less than 15°), and large density contrast (more than ten times the mean volume density of galaxies) relative both to the immediate foreground and background. The structure seen in the northern portion of the survey region is quite visually different from that seen in the south, and the topology of the structure is complex. The foreground void cannot result from observational bias and is tube-like, not spherical. Around this void, connective features appear to link the Local and Pisces-Perseus superclusters. For volume-limited samples that are complete to some absolute magnitude, we can construct an array of local density in order to look for environmental dependences on galaxy properties and their clustering tendencies. Whereas the high surface brightness objects tend to cluster on smaller scales, HI-rich low surface brightness galaxies represent the widely dispersed supercluster population. The density contrast between the main ridge and the foreground void is about a factor of two lower for low luminosity objects than for high luminosity ones. The former do not fill the void and indeed trace the same structure seen by the high luminosity galaxies. Variations in the morphological mix are smooth and continuous over the whole range of densities sampled by the supercluster and morphological segregation is seen to occur even along the spiral portion of the Hubble sequence. Changes in the luminosity function are not just the consequence of morphological segregation, but result also from a depletion of bright galaxies in the low density regions. The Pisces-Perseus supercluster serves as a unique laboratory for the study of complex large scale structure in the local universe.

67.02
A Cost Effective Strategy for Identification of Cool Stellar Targets in ROSAT All Sky Survey Data
E.R. Craine (Western Research Company, Inc. – Tucson, AZ)

The Roentgen Satellite (ROSAT) x-ray all sky survey will detect on order 10^9 x-ray sources, following a projected 1990 launch. A problem of primary interest is evaluation of the x-ray properties of late M dwarf stars as derived from ROSAT survey data. A useful tool for identification of cool dwarfs which may be detected by ROSAT is the Seward Observatory Near Infrared Photographic Sky Survey. This survey allows easy identification of stellar objects with very large V-I colors; earlier analyses by the author confirm a high rate of cool dwarf detection using this database at high galactic latitudes. We have underway the development of a catalog of cool dwarf stars derived from the infrared survey. These stars will be characterized, where possible, using extant x-ray data and will provide a list for comparison with subsequently obtained ROSAT data. Extraction of very red stars from the infrared survey involves CCD imaging of segments of the 4.5° photographic fields in both V and I bands. The resulting 512 x 512 px images are compared using a video comparator routine resident in a host 80386 microcomputer. The same routine permits rapid and easy measurement of equatorial coordinates. We discuss the methodology for constructing the catalog and outline follow-up observations that would be useful to obtain. A characterization of some of the stars already in the catalog is presented. This work has been supported, in part, by a research grant from the National Aeronautics and Space Administration.

67.03
Photometry of Low-Mass Red Dwarf Stars
H.C. Harris, C.G. Dahm, D.G. Nonet, and F.J. Vrba
(USNO, Flagstaff)

Photometry in B, V, and I of low-mass red dwarfs is being obtained as part of the program observing stellar parallaxes at the Naval Observatory. Color terms must be carefully evaluated in order to account for the passband of each CCD/filter combination. For these very red stars, with (V-I)_{cc} as large as 4.0, uncertain color terms are still a significant source of error. We discuss these difficulties and present results for some of the lowest luminosity dwarfs and subdwarfs that we have observed.