ABSTRACTS

Session 17: HEAD/CPD Special Session
0930–1200 (Ballroom West)

17.01 Cosmic-Ray Acceleration at Shock Fronts.
R. BLANDFORD, Caltech.

17.02 Electrodynamic/Hydrodynamic Models for Jets
in Galactic Nuclei, R.V.B. LOVELACE, Cornell University.

17.03 Anisotropy of Highest-Energy Cosmic Rays,
J. LINSEY, University of New Mexico.

17.04 Astrophysical Observations by the Fly’s Eye,
J.W. ELBERT, University of Utah.

Session 18: Interstellar Matter (II)
0930–1200 (Forum Room)

18.01 HI Zeeman Measurements at Five High-Latitude Positions,
C.HEILES, T.TROLAND, M.STEVENS,
UC Berkeley and U. Kentucky. We present positive measurements of Zeeman splitting of the 21-cm line
seen in emission in five high-latitude positions, and
a number of other upper limits. Measured field strengths range from 6.7 to 11.4 \( \mu G \). Regions
with positive measurements typically have magnetic energy densities that are more than an order of
magnitude greater than the thermal energy densities of the gas.
A particularly interesting result for G210.35–20,
located about 1.5 deg from the Orion nebula and in the
large southern CO cloud of Rutter et al. (Ap J 213, 521),
contains two Zeeman spectra within a single profile. One of these is associated with the
HI cloud surrounding the Orion complex and has a
field strength of 10.2 \( \mu G \). Under our current
interpretation, the other is associated with the CO
cloud; the field is in the opposite direction to that
in the HI cloud. A previous Zeeman result in the Galactic
plane, reported by us in the abstract for the 157th AAS meeting in Albuquerque, is erroneous.

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On leave from the Institute of Mechanics, Academia Sinica, Beijing, China, where the above work was completed.

16.13 Horizon-Free Universe, K. BRECHER
and A. FRENKEL, Boston U. We have studied a theory of gravity, consistent with all present
astronomical observations, which is an extension
of General Relativity generated by a gravita
tional field Lagrangian proportional to
R + A^{2} (where R is the scalar curvature and A
is a new dimensional constant). In this theory
we find cosmological solutions without a parti
cle horizon for any value of A. For A nega
tive and |A| small enough (|A| < 10^{-12} cm^{2}) the
dynamical behavior of the isotropic models
differs from that of the corresponding conven
tional Friedmann ones only at very early
stages, when the density exceeds nuclear den
sity. At this pre-Friedmann stage, the theory
indicates an exponential growth of perturba
tions of metric and matter, possibly allowing the formation of small-scale structures out of
statistical fluctuations. Thus, the theory may
resolve two old difficulties of the General
Relativistic cosmologies: the global uniform
ity and small-scale inhomogeneity of the
universe.

16.14 Galaxy Contributions to the Optical Spectra
of Cyg A and Mkr 744, D.E. OSTERBROCK, Lisp Obs., BEA,
UC Santa Cruz – Cyg A is a narrow-line radio galaxy with
a very strong featureless continuum in the optical re
gion. Previous published scans by Osterbrock and Miller
showed no sign of the underlying galaxy absorption-line spectrum. More recently, special high-dispersion, long-
exposure scans have been obtained in an attempt to de
tect the Mg I b 5175 absorption feature, the best sig
nal of a galaxy in this situation. Although difficult to see because it is between fairly strong [N II] 5199 and
weak (Fe VII) 5159 emission lines, the Mg I feature is
definitely present in Cyg A. Its equivalent width is
approximately 2.4 \AA. If the underlying galaxy has an
absorption-line spectrum similar to a giant elliptical,
this corresponds to about 0.4 of the optical continuum near 5175 coming from the galaxy, and 0.6 from the
featureless continuum of the active nucleus. Late-type
spirals have weaker Mg I b absorption, but other fea
tures such as Fe II 5269 then have comparable strength; these features are not visible in the Cyg A scans.

Mkr 744 = MCG 3786 was identified by Afanas’ev,
Lipovetskii and Shapovala as a galaxy with weak broad
emission in its spectrum, together with narrow emission
lines. Its spectrum is of the type I have called Seyfert
1.9. Like the other objects of this type, Mkr 744 has a
relatively strong galaxy absorption-line spectrum, and
many of the apparent emission lines that have been iden
tified in it by these authors are actually high points in the continuum between absorption features.

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