

Alternative Cosmology Group Newsletter - November 2007

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Are Quasar Redshifts distance-related or intrinsic?

Three papers this month deal with the continuing question of whether the redshifts associated with quasars are purely connected with the distances, as the conventional view contends, or if they have intrinsic complement. Halton Arp, a pioneer of the view that the redshifts are intrinsic, reviews evidence that he believes shows how quasars evolve, with intrinsic processes changing their redshifts.

M. B. Bell uses the apparent motion of the jets emitted from quasars and active galactic nuclei (the smaller version of the same objects) to argue that redshifts are intrinsic, not indicative of distance. Radio observation over periods of years have shown bright knots of plasma moving outwards from quasars along narrow jets. Bell contends that the relationship between the maximum angular velocity observed in the jets for a quasar of a given apparent magnitude is most easily explained if the sources have intrinsic redshifts.

More data that may affect this debate is contained in the paper by Kronberg et al on measurements of magnetic fields in the direction of quasars and radio galaxies. When radio waves or other electromagnetic radiation passes through plasma clouds that have magnetic fields, the direction of polarization of the radiation rotates. The rate of rotation is connected to the strength of the magnetic field, the density of the plasma, its size and the wavelength of the radiation. By measuring the polarization of radio waves emitted by quasars at various wavelengths, observers can get an estimate of the magnetic fields of the plasma that the radiation has passed through.

Kronberg et al find that magnetic field appears to increase with increasing redshift. By itself, this does not distinguish between the two hypotheses, since either this could be a result of the radiation passing through an increasing depth of magnetized clouds, or because higher intrinsic redshift is a product of higher intrinsic magnetic field. However, the data can provide a good test of theories that attempt to explain how the redshifts could be produced by interactions with plasma.

Quasars and the Hubble Relation

Authors: H. Arp

<http://arxiv.org/abs/0711.2607v1>

A Global Probe of Cosmic Magnetic Fields to High Redshifts

Authors: P. P. Kronberg, M. L. Bernet, F. Miniati, S. J. Lilly, M. B. Short, D. M. Higdon

<http://arxiv.org/abs/0712.0435v1>

Evidence in Support of the Local Quasar Model from Inner Jet Structure and Angular Motions in Radio Loud AGN

Authors: M.B. Bell

<http://arxiv.org/abs/0711.4531v1>

Where do the highest energy cosmic rays come from?

The highest energy cosmic rays have energies one hundred million times higher than the energy produced in the Earth's largest particle accelerators- 10^{20} eV. It is a puzzle what processes accelerate this ultra high energy particles and where they occur. Todor Stanev provides a useful if brief review of alternative theories of how these energies are produced. But the Auger cosmic ray observatory should provide some answers, since it has observed some 56 of this rare ultrahigh-energy particle. Unfortunately, researchers do not agree on the interpretation of the results. The Auger collaboration scientists contend that the direction of the cosmic rays sufficiently correlate with nearby active galactic nuclei to identify that these are the sources. However, Gorbunov et al argue from the same data that this analysis does not correctly take into account the expected $1/r^2$ reduction in flux from a given source with increasing distance. So they conclude, the cosmic rays are not in fact correlated with the nearby AGN.

Ultra High Energy Cosmic Rays: origin and propagation

Authors: Todor Stanev (Bartol Research Institute, Department of Physics and Astronomy, University of Delaware)

<http://arxiv.org/abs/0711.2282v1>

Correlation of the highest energy cosmic rays with nearby extragalactic objects

Authors: The Pierre Auger Collaboration

Journal reference: Science, vol.318, p.939-943 (9 November 2007)

<http://arxiv.org/abs/0711.2256v1>

Comment on "Correlation of the Highest-Energy Cosmic Rays with Nearby Extragalactic Objects"

Authors: Dmitry Gorbunov, Peter Tinyakov, Igor Tkachev, Sergey Troitsky

<http://arxiv.org/abs/0711.4060v1>

Can MOND be tested in the Solar system?

MOND, or modified gravity theories, remain a hot topic. Lorenzo Iorio uses data on planetary motions within our own solar system to argue that even tiny modification to Newtonian gravity are ruled out. It will be interesting to see if MOND advocates reply to this paper.

Constraining MOND with Solar System dynamics

Authors: Lorenzo Iorio

<http://arxiv.org/abs/0711.2791v1>