

# CONTINUITY IN THE VIOLENT PHENOMENA TAKING PLACE IN THE NUCLEI OF GALAXIES AND QSOs

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**ABSTRACT.** The evidence for continuity between the observed properties of QSOs and the active nuclei of galaxies of various types is reviewed. It is concluded that the continuity argument is compatible with many of the observations, provided (i) that the idea of directed bulk relativistic motions in many objects which show apparent superlight velocities or very large rapid flux variations is accepted, and (ii) that all of the evidence for the physical associations of QSOs and galaxies, and pairs of QSOs, with very different redshifts, is ignored. Since bulk motions with  $v \geq 0.99c$  are very difficult to maintain in the presence of any appreciable amounts of diffuse gas, and since much of the evidence for non-cosmological redshifts is compelling, a new approach is outlined. It is proposed that many QSOs and BL Lac objects are gravitationally stable coherent objects which are ejected from galaxies comparatively closeby. They radiate assymetrically in a cone directed away from their direction of motion. They must be ejected from galaxies with velocities which range from very small values for QSOs with low redshifts which appear to lie in galaxies, to values in the range  $0.1c-0.9c$  for the higher redshift QSOs. Some BL Lac objects may be embedded in galaxies, while some may be coming towards us.

It is suggested that models of this type which imply reduced distances and lower luminosities for the QSOs can be used to explain the full range of phenomena seen. Physical models need to be worked out, since the only mechanism which has so far been proposed to eject coherent objects from galaxies is the slingshot mechanism which appears to give rather low velocities of ejection.

*Key words:* GALAXIES-NUCLEI - QUASARS

## DISCUSSION

**DOTTORI:** Together with Alex Schmidt, we have analyzed the spectrum of NGC 772, an Arp's galaxy with two parent objects of higher redshift, like the one you have presented. The spectrum looks very normal, without emission. Could you comment something about spectral statistics?

**BURBIDGE:** Many of the bright galaxies apparently associated with QSOs with large redshifts have spectra which are quite normal.

**DULTZIN-HACYAN:** What is your idea on the continuity argument? It is very striking that a Seyfert 1 nucleus is really undistinguishable (spectroscopically) from a quasar.

**BURBIDGE:** The continuity argument is attractive but it requires that you assume without proof continuity in your distances, i.e., redshifts. Also the spectra of Seyferts and QSOs are not identical. Differences in the ratios of line strengths to continuum between Seyferts and QSOs are present. Also, I would stress that continuity provides one kind of evidence and discrepant redshifts another. They are in conflict but this does not mean that one kind of evidence is wrong.

**AGUILAR:** The cases you have presented of close association in the sky of quasars and galaxies with very different redshifts are very tantalizing; but in order to really use this as an argument in favor of close association in space, you have to search for quasars away from galaxies in the field, and show that even if you look hard for them you cannot find them as

often and as close to the galaxies you talk about; in other words you need a control sample. Could you elaborate on this?

BURBIDGE: Work on a control sample has been under way for some time, i.e., Arp, Ulrich, Hewitt, and Burbidge, have been searching for QSOs both near bright galaxies and in places where there are no bright galaxies. The preliminary results bear out the results shown here. But I would like to make the point that the statistics shown are based on comparison of the number of QSOs found near bright galaxies with the number expected based on surface density on the sky in many areas as a function of magnitude, based on work by many authors such as Sandage and Luyten, D. Wills, and others.

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