QUASARS, GAMMA RAY BURSTERS AND BL LACERTIDS

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New observations suggest that high redshift quasars can be turned into Gamma Ray Bursters and BL Lacertids by interaction with absorbing clouds in their vicinity.

Like quasars, Gamma Ray Bursters (GRB’s) are high redshift objects which emit copious amounts of high energy radiation in their outburst phases. Recently a startling observation for which experts have no plausible explanation was reported \(^1,2\). The new evidence shows that supposedly intervening galaxies are 4 times more prevalent along lines of sight to GRB’s than to quasars. Since quasars and GRB’s of the same redshift are supposed to be at the same extraordinarily large distances we are sampling a given path length through the Universe in different directions. To put it most simply: *If the only difference between these path lengths is that GRB path lengths have more absorbing clouds, then these Gamma Ray Bursters and the absorbing clouds must be physically associated.*

Because GRB’s are very active objects they would be expected to have disrupted components and ejected clouds in their vicinity. One obvious possibility is that these furnish the the intervening absorption lines which are seen in their spectra. Clouds ejected in the direction of the observer would have smaller Doppler shifts.

The observed shifts in the absorption lines, however, can approach the speed of light and are in general much too high to be dispersion velocities in a group of extragalactic objects. Also the absorption systems are not generally excited and seem to represent fairly quiescent clouds.

An alternative suggestion is that the absorbing clouds are older ejections and remnants which had intrinsic redshifts which have now partially decayed with time. If we rule out high approach velocities we observationally have a physical association of high and low redshift objects which are supposedly at much differenter distances. Where have we seen that before? Simply for 40 years in the association of high redshift quasars with lower redshift galaxies \(^3,4\). Since this appears to be the only alternative it is interesting to examine it in a little more detail.

What we seem to be seeing is high intrinsic redshift GRB’s at the closer distance of the absorbing clouds. Spatially the GRB’s must be in closer proximity to their associated galaxies (or clouds of gaseous material ripped out in the process of explosive events). The difference between the quasars, which have also been shown to be much closer than their redshifts conventionally dictate, and the GRB’s would then be that the GRB’s tend to burst more violently, perhaps carrying older gas clouds from their parent galaxies with them or in their wake. Or simply encountering them in the extended vicinity. The quasars on the other hand would come out more cleanly, for example, along the minor axes of their ejecting galaxies \(^5\). (The latter reference being very direct observational confirmation for ejection of intrinsically redshifted quasars.)

In this case the whole ensemble of quasars and GRB’s with their galaxies/gas are much closer to the observer than their redshifts would conventionally place them. We would then have nearby clusters and groups with a range of object types. They would have a mixture of different ages and differing intrinsic redshifts. This is what the observations seem to require in galaxy/quasar associations.

As further support of this interpretation one can cite Stocke and Rector in 1997\(^6\) that BL Lac objects also have excess MG II absorbers in their line of sight. This represents a different class of high redshift objects which show the same excess of MGII absorbers as in the GRB’s. The important point is that BL Lac
objects are like quasars but with their gaseous outer layers stripped away and only the continuum emitting surface spectroscopically observable. What could cause this difference between quasars and BL Lac’s? The obvious answer would be that the latter was the result of a collision with a gas cloud and thus gave rise to another variety of quasar similar to the case of the GRB’s. As further support for this interpretation the BL Lacs are observed to be found closer in angular separation from active parent galaxies. (This was found from Ultra Luminous X-ray sources which were accepted as belonging to low redshift galaxies. The objects turned out to be essentially all high redshift quasars but with a higher percentage of BL Lac’s. Presumably the stripping collision stopped the BL Lacs closer to the parent galaxy.)

A key object extensively observed by Margaret Burbidge is AO 0235 +164. It seems to unlock in detail the absorption excesses in front of the GRB’s and BL Lac’s which has puzzled the established explanations.

Surely these different redshift objects within a few arcsec of each other are at the same distance. The high redshift BL Lac has z= .940. Absorptions take place in or closely behind clouds emitted by the z = .524 galaxy and a z = .851 system. The fact that the emission in the the BL Lac at z = .940 is so weak would indicate its outer emission layers had been almost completely stripped in a collision.

The developments discussed here have now shown excess absorption clouds are typical of sight lines to BL Lac’s and GRB’s. That means the close coincidence of the AO 0235 objects is not just an extremely unlikely accident but is established as a class characteristic. The finishing touch is that the BL Lac AO 0235 +164 is a very strong radio source, IR source and a Gamma Ray Source!

The summary conclusion then becomes a picture where a quasar is ejected from an active galaxy, travels out into intergalactic space. If it meets a cloud it can become a BL Lac with a strong continuum spectrum which can show a range of weak lines - or a GRB with strong high energy radiation. The nature of the resultant high redshift object should be determined by the density of the original quasar and the the density of the cloud impacted as well as the relative speed and directness of the collision. GRB’s, BL Lacs and quasars would then all be different forms of the same kind of object.

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