

Offered Title: You Say QUASAR I Say QSO

Way back in 1965 my buddy and fellow astronomy geek astounded our little four-person club in Iron Mountain, Michigan by announcing the existence of QUASARS. The acronym sounded exotic and he explained its meaning, "quasi-stellar radio source". Wow, that had to be the coolest discovery ever! Maybe it meant distant lifeforms communicating with the universe?! In the case of quasar CTA 102 a Russian astronomer claimed it was, and Folk-Rock band the Byrds recorded a spacy ditty in its name. As it turned out, they're not really that cool, but still a huge discovery about the evolution of our universe.

First detected in the 1950's but not understood, these objects remained enigmatic because their optical spectra defied interpretation. Then, in the early 1960's astronomers at Mt. Palomar were able to get a clean optical spectrum from 3C 273. Well, they got the spectrum but again were stumped. The spectrum emission lines (bright lines indicating the presence of specific elements – in this case hydrogen) didn't make sense.

Then came the "ah-ha" moment. After struggling with that spectrum, Maarten Schmidt realized the emission pattern made perfect sense...if it was shifted, moved into shorter wavelengths. This meant the spectra of these objects are what is termed "redshifted", skewed toward longer wavelengths. Redshift can be due to doppler effect and/or dust. With these objects the redshift was mostly doppler and way beyond known redshifted objects. This discovery was the key, then in 1964 U.S. astrophysicist Hong-Yee Chiu coined the term "quasar".

Now having the key, astronomers around the world were able to study quasars and identify their basic nature. These objects are very, very distant and their enormous redshifts means they are moving away very, very fast. Their distance ranges from 700 million to 29 billion light years and their speed from 16 to 37% the speed of light. That's smoking!

Turns out quasars represent some of the youngest objects in our visible universe and are considered models of early galaxy formation. We see them as they were 700 million to 13 billion years ago (can't say 29 billion years ago – that's before the big bang). The time – distance thing can be weird, maybe the subject of a future article.

A quasar is the center of a very active galaxy, basically a supermassive black hole, hundreds of millions to billions of times the mass of our Sun. Our relatively quiet Milky Way galaxy by contrast has a supermassive black hole with only a few million times the Sun's mass.

What about QSO? We know now that most "quasars" are not radio sources, and therefore called "quasi-stellar objects", QSO. Same structure, just no AM or FM. No top 40 or...Cosmic Power Hour? CTA 102?

I wonder, could one of those quasars/QSOs be the Milky Way 12 billion years ago? Naw.

What's in the Sky?

January 27: A first quarter Moon and bright star Aldebaran get close in the pre-dawn sky.