A Universe Older Than Itself?

(from the cave of the Troglodyte astronomer)

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A European Space Agency team found three times more iron in quasar APM 8279+5255 than exists in our solar system today. So what, you say? The catch is that this quasar is roughly 13.5 billion light years away, if its redshift is any indicator. But that means the light from the quasar has been en route to us for 13.5 billion years, leaving precious little time after the Big Bang explosion for this quasar to form, develop lots of iron, and send the iron lines in its spectrum on their way to us. It takes many generations of supernovas, the only known source of iron in stars, galaxies, and quasars, to get that much iron into an astrophysical body. In fact, other things being equal, it should take three times as long to develop that quasar than it took for the many generations of stars that preceded our Sun to form the Sun with as much iron as the Sun has today. The large iron content of the quasar is therefore a major puzzle. Only two explanations appear possible, and either one is going to upset some theorists: (1) the Big Bang redshift-distance-age relationship is wrong; or (2) the early universe contained “iron factories” producing extra iron by an unknown physical means. Although this latter possibility would do less violence to the Big Bang theory, it presently seems unimaginable for that much iron to form in any other way, so "iron factories" seem the less likely possibility. But that leaves only the conclusion that the redshift-distance-age relationship is wrong. So the universe would be older than the time it would take to expand to its present size (basically, the Big Bang is wrong); or redshift is not a reliable distance indicator for at least quasars (basically, the Big Bang is wrong, but maybe not so totally wrong as in the other possibility). If you see any response from cosmologists, send news of it down here to the cave. On most days there's more excitement in watching the moss grow than waiting for explanations of the latest problems for cosmologists. The bigger the problem, the more likely it is to be ignored. [*ApJ* 573, L77-L80 (2002) & <http://www.spaceflightnow.com/news/n0207/10age/>]

In the same month, yet another new problem has surfaced for keeping quasars in their Big Bang corral, from which they love to stray. The four farthest-known quasars, or should I say the four with the highest redshifts (5.8-6.3), are all exceptionally over-bright for their supposed distance. Normally, this would mean an extra-massive black hole in their centers. But once again, these objects have had too little time since the Big Bang to be forming such huge black holes. We now see another trial balloon being floated: Objects that far away are more likely to be brightened by gravitational lensing than closer objects. Maybe as many as one in three quasars our there are lensed, increasing their brightness by a factor of 10 or more. Of course, we are more likely to discover the brightest ones, so the distant quasars we know about are likely among the brightest lensed cases. Okay, so what's the problem? Well, Big Bang cosmologists have almost all flung their bodies and souls onto the "reionization" bandwagon, which it now appears may be headed at breakneck speed toward a precipice. The Big Bang must explain why there is no trace of absorption by intergalactic hydrogen clouds near the hydrogen emission lines in quasars. The answer must be that quasars re-ionized the universe again (the Big Bang itself having done the job the first time around) somewhere not to far above redshift z = 5, because ionized hydrogen cannot absorb light. After years of searching for evidence of the "epoch of reionization", traces of it finally showed up in the most distant of these four quasars. Everyone breathed a sigh of relief, and most agreed the reionization epoch had finally been found near redshift z = 6.3. But this new result says that the light from this quasar has passed through a lensing galaxy at some intermediate distance, and we therefore cannot trust the hydrogen absorption seen to be really at the quasar's distance because it is more likely to be absorption by the lensing galaxy. Moreover, this same mistrust will probably apply to all other distant quasars we find for a while. So the bottom line is, we have no evidence for a "reionization epoch" yet. And all those earlier paradoxes are still in full force and effect. For example, we have the quasar "proximity effect", whereby dense clouds close to a quasar can escape reionization while more distant clouds are fully ionized. Anyway, this lensing theory has a rare virtue for cosmological patch theories – it can be tested by doing searches for the lensing galaxies. But I expect the decadal spring floods in the cave long before anyone gets around to looking, because the hapless astronomer who tries will be booed for his/her efforts, whatever they show. The bearer of bad news is seldom rewarded. [*Nature* **417**, ix & 905-906 & 923-925 (2002); *Science* **296**, 2317-2319 (2002)]

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