

# Briefing

**To:** Captain Howard  
**From:** Astrophysics Group  
**CC:** Ships Computer  
**Date:** 27/06/02  
**Re:** Third Conclusions from Further Astrophysical Observations

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## Summary

**URGENT:** We are no longer in our own universe. While space seems to be expanding at present (just as in our own universe), this expansion seems to be a recent phenomenon: in the past it appears to have been contracting.

## Data

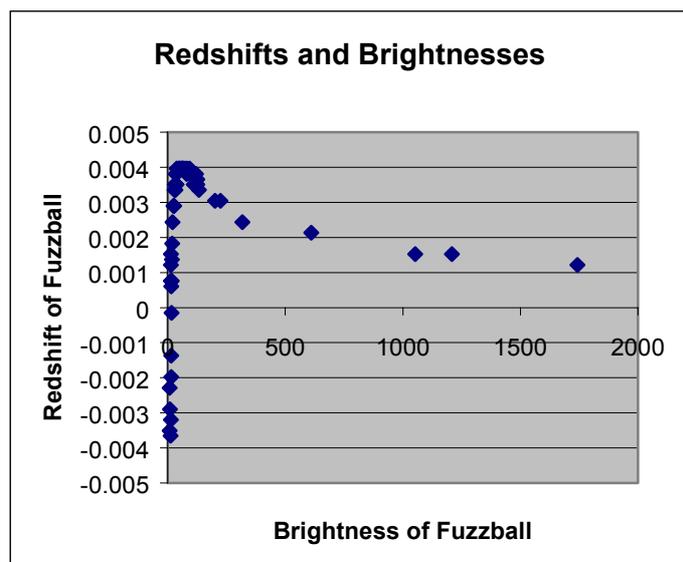
It is now clear that fuzzballs are actually galaxies. They appear to be dwarf elliptical galaxies or giant globular clusters. No disk galaxies are seen: further evidence that we are in a different universe.

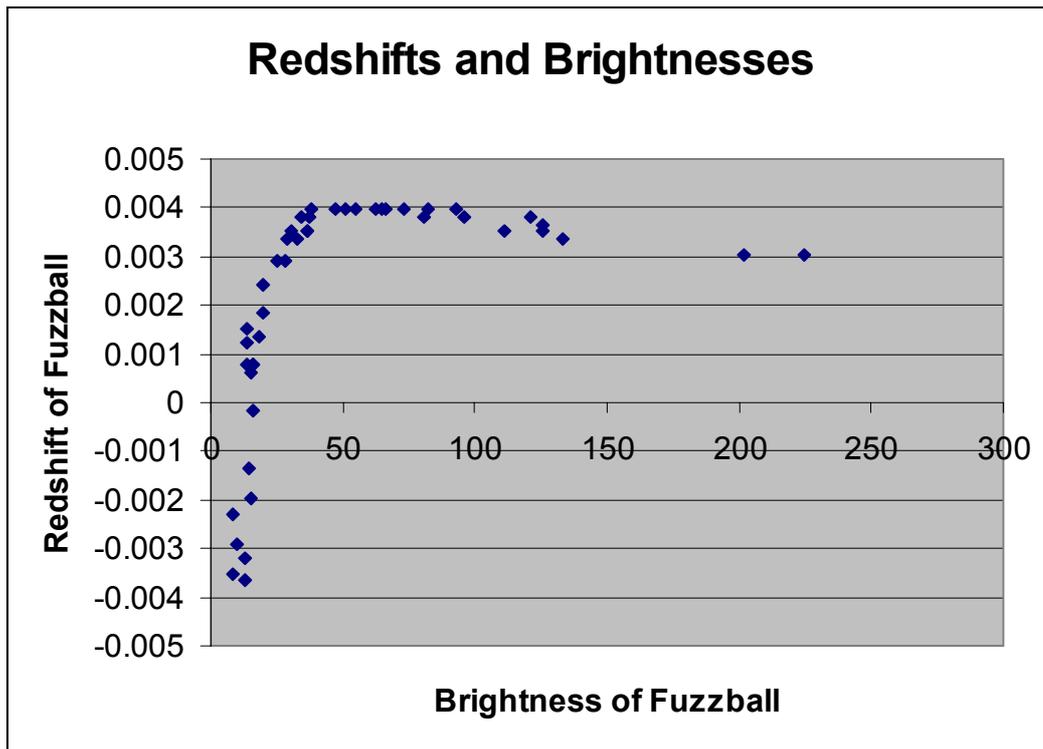
Using the automatic telescope, we measured the redshifts and brightnesses of a large number of fuzzballs in all regions of the sky.

The results did not seem to depend on where we pointed the telescope: the same conclusions could be reached from fuzzballs in any part of the sky.

## Correlation between brightness and redshift

The brightnesses and redshifts of all the fuzzballs measured are shown in this graph. Notice the striking pattern.





Here is a close up of the previous graph, showing the pattern for the vast majority of fuzzballs which are not bright.

What would we expect to see in our own universe? The further away a galaxy is, the fainter it appears. And because our universe is expanding, the further away a galaxy is, the bigger its redshift. So we would expect to see redshifts decrease as the brightness increases.

For the brightest fuzzballs, those from which we detect more than 100 photons per second, the pattern seems to match what we would expect. The fuzzball galaxies are indeed redshifted, and the fainter ones are more redshifted than the bright (nearby) ones. This suggests that space is indeed expanding. Since the light from the 100 photon fuzzballs set out, this universe has expanded by about 0.4%.

But this all breaks down when we look at the fainter (and hence more distant) fuzzballs. They show smaller redshifts, and the very faintest ones actually show negative redshifts (blueshifts). This suggests that the universe was once *larger* than it is today, and the photons have been compressed while they have been flying.

We therefore hypothesize that this universe started larger, and shrank. It reached minimum size roughly when the light from the 100 photon galaxies set out, and has been expanding since then.