

Chomping on Einstein's Kitty Crumbles
-- Jay Reynolds Freeman --

I don't think there have been many observations of Einstein's Cross with less aperture than Harvey, my Celestron 14, so when folks are skeptical of seeing this elusive object with small telescopes, they may well have my reports in mind. They certainly ought to -- those were tough observations, on the ragged edge of what a C-14 can deliver. Also, detail can get distorted and exaggerated with retelling, and though my postings get mentioned in the amastro group and are referred to in some of the deep-sky pages on the web, I don't think any of those sources has quotes from my reports, or links to them. I worry that people will think that I made stronger claims than I actually did -- that would serve nobody's interest -- so I hope you will forgive me for putting together this compilation and summary.

The summary comes first, for you whose fingers are twitching over the "delete" key: All I claimed to see with my C-14 was occasional ill-defined structure, including elongations, at the heart of lensing galaxy CGCG 378-15. For details, keep reading...

I became interested in Einstein's Cross as an observing target on hearing that Barbara Wilson had seen several of its components with her 20-inch Newtonian. I thought that if she could see separate pieces, perhaps I could detect some hints of detail with half the light gathering ability. On Saturday, December 19, 1998, I had a chilly but transparent night at Fremont Peak, a site nearly 3000 feet up in central California's coastal ranges, and gave it a try. The report of that night's observation is in the "Observing Reports" section of the TAC web site, whose URL is <http://www.observers.org>. The complete URL for the specific report is <http://www.observers.org/reports/98.12.19.3.html>. I won't quote it all here, but at 326x (12 mm Brandon):

I cannot claim to have identified the separate sub-images [of the quasar] individually, resolved from one another as if they were components of a faint double star. Indeed, much of the time I could not see anything at all -- seeing jitter did not permit continuous observations at 326x. But when seeing steadied, it was clear that there was a small structure at the heart of the galaxy, just a few arc-seconds across, and I could tell that it had an irregular shape. I don't think there is much doubt that I was seeing the combined lobes of Einstein's Cross. It would be fun to reexamine the object on a night of truly fine seeing, perhaps with more magnification. I suspect that Harvey is capable of showing it with a little detail.

Most of the reports of seeing Einstein's Cross that I know of, have involved Dobson-mounted Newtonians with apertures substantially larger than 14 inches, and some extremely good observers have had trouble seeing more than one or two of the lobes of the cross at those apertures. Therefore, I wish again to stress that I did not see any of the components separately -- in double-star terms, I had an elongation (actually, several), not a split.

I was delighted to have any success with so tough an object, but nobody else braved the Peak that frosty night, so I had no one to check the observation. The next summer, I took a few hours at a TAC Lassen Star Party to let several folks look at Einstein's Cross through Harvey, from an elevation a bit over 8000 feet. That was Wednesday, August 11, 1999. The report, which covers the entire star party, is at URL <http://www.observers.org/reports/99.08.11.html>, on the TAC site. The portions about Einstein's Cross read in part as follows:

... Darker sky than at Fremont Peak made the lensing galaxy, CGCG 378-15, easier to see -- I could hold it elongated with direct vision at 98x, in my 40 mm Vernonscope Erfle, and could see pronounced central brightening. More magnification gave a view which to my eye resembled the one I had last December, and a lot less jiggles from the calmer wind made it much easier to keep track of what I was looking at as I changed eyepieces and moved the telescope around, looking for stars to focus on. I tried 244x, 326x, and 489x, using respectively 16 mm, 12 mm, and 8 mm Brandons. The higher magnifications blurred out the far reaches of the galaxy to the point of invisibility, but magnified the central area and began to reveal its detail.

The best view for me was at 489x, and was intermittent, for seeing did not permit continuous critical observation at that magnification ... what I saw when seeing settled was a blur that was not quite smoothly round, rather, that had structure, and the exact nature of the structure was difficult to identify. Using averted vision, some times I saw elongation in one direction, some times in a direction at 90 degrees to the first, and once or twice I glimpsed a multi-lobed pattern, perhaps cross-shaped but I would not wish to claim so definitively, but if so, it was reminiscent of the sloppily calligraphed 'X' of alphabet soup, novelty breakfast cereal, or certain brands of dry cat food. Alas, "Einstein's Kitty Crumbles" just doesn't have the right

je-ne-sais-quois for an object half way to the edge of forever. I certainly did not see any of the lobes of the cross as separate: as last December, what I was seeing could be described in double-star terms as elongations, not separations. Occasionally the very center of the structure appeared as star-like as the stars elsewhere that I was focusing on. It would have been most interesting to view the Cross from a site this dark with excellent seeing, but no such luck.

I showed this apparition to about eight people... We all had eyes with different degrees of near- or far-sightedness, and an 8 mm Brandon does not have enough eye relief to permit wearing glasses, so the drill was generally as follows: I would move the telescope to a nearby stars [sic], call attention to the unsteady seeing, and let the observer focus to his or her own satisfaction. Then I would step to the eyepiece again, and without changing the focus, move the telescope back to CGCG 378-15, and return it to the observer. Fortunately, though several people chose a focal point noticeably different from the one I would have picked for my own eyes, no one's vision differed so much from my own that I could no longer see the objects.

Results differed. One person, admittedly a newcomer to deep-sky work, could not see anything at all in the field for the cross. One other saw only a diffuse object with no structure. Everyone else saw one or more of the anisotropies that I mentioned above. Each of those others at least saw elongation in one direction or the other, one or perhaps two saw it in both directions, and one person mentioned a 'V' shape. The experiment wasn't entirely "blind" -- we were all talking about what it was that we were seeing -- but at least one observer asked not to have the object described to him as he stepped to the eyepiece, and nonetheless saw anisotropic structure. I suspect I saw the most structure, but not because I have the best vision, rather because it was my telescope and I spent the most time at the eyepiece.

... after the Cross-smitten multitudes had left, all I did before tear-down was look at a couple of double stars to check seeing and verify that we had not been wildly mistaken about the angular size of what we had been looking at. Still at 489x, both pairs of epsilon Lyrae were cleanly resolved, and indeed, spanned vaguely the same angular size

as had the object at the heart of CGCG 378-15. [In case it is not absolutely clear, I meant that each pair of the Double Double spanned about the same angle as the entire Cross.]

Since then, I haven't had better seeing for Harvey when Einstein's Cross has been well placed, but I did look at the Cross once more, using the 36-inch refractor at Lick Observatory, on a "Volunteer Appreciation Night", given for those of us local amateur astronomers who have helped out with Lick summer public programs. That is the only chance I myself have had to compare my observations using Harvey with the view through a much greater aperture. The report is on the TAC site, embedded in a larger document that covers many nights' observing. The URL is <http://www.observers.org/reports/2000.09.30.6.html>. Portions relevant to Einstein's Cross include:

The observing highlight of these sessions was volunteer appreciation night at Lick Observatory, where I assist at summer public programs. We looked at a number of interesting objects with the 36-inch refractor. One was Einstein's Cross, a gravitationally lensed quasar at a distance of eight billion light years. I had seen it with my C-14, with difficulty, well enough to see that it was non-stellar, yet without clearly resolving any components of the image. The view through the 36-inch was of course much brighter, but the seeing was similar to what I had encountered with the C-14. Thus our view of the cross, at 496x, also did not clearly resolve any of its components, but we did find the elongations, that indicated partial resolution, easier to see.

That text does not make clear, that most of the observers present were indeed able to see asymmetric structure through the 36-inch refractor.

If any one is curious about any particulars of these observations that I have not mentioned, let me hear from you.