

# John Huchra

## (1948–2010)

Astronomer who mapped the structure of the Universe.

**J**ohn Peter Huchra worked more hours in a day and observed more nights in a year than anyone else I know. In doing so, he helped establish our modern picture of the Universe as a frothy place, with sheets and filaments of galaxies enveloping giant empty voids. He also pioneered a technique to obtain more accurate measurements of the Hubble constant — a step that ultimately helped astronomers to pin down the age of the Universe as 14 billion years.

Huchra was born in 1948 to a train-conductor father and housewife mother in a poor neighbourhood of Jersey City, New Jersey. As he moved from success to success in academia, his humble beginnings remained a source of quiet pride. As an undergraduate, he helped to cover his expenses by unloading trailers. Even as a Harvard professor and member of the National Academy of Sciences, he said he continued to pay his union dues to the Teamsters so he could drive a truck if astrophysics didn't work out.

Huchra arrived at the California Institute of Technology in Pasadena as a PhD student in 1970 with the idea of becoming a theorist, but was quickly drawn to observational astronomy. He made observations using the most modern equipment and the most antique. He was the last person, for instance, to use the perilous Newtonian focus at the top of the Mount Wilson 100-inch (2.5-metre) telescope above Pasadena. This involved sitting in the dark on a platform perched at the top of the telescope, making observations while the enormous machine slowly pivoted to follow the target.

### WORKING THE REDSHIFT

In the late 1970s, Huchra joined forces with Marc Aaronson at the University of Arizona and Jeremy Mould at the Kitt Peak National Observatory, both in Tucson. The team used a new method — infrared measurements of galaxy brightnesses — to calculate more precise distances between our Milky Way and other stellar systems. Legend has it that Huchra observed 130 nights in a single year on this project. This dwarfs the observing time allocated to a good-sized astronomy department and is a decade's worth of observing for many less-energetic astronomers.

The Hubble constant is the ratio of the velocity of galaxies (which are moving away from us as the Universe expands) to their distance from us. Huchra became a master at measuring that velocity, or redshift.



By 1984, the distances derived by his work with Aaronson, Mould and their associates produced evidence for a relatively high value of the Hubble constant: about 91 kilometres per second per megaparsec ( $\text{km s}^{-1} \text{Mpc}^{-1}$ ).

A strong theoretical argument against such a high value for the constant came from the ages of the stars. If the Hubble constant were as high as Huchra and his colleagues claimed, the Universe would be younger than the oldest stars in our Galaxy. Huchra and his colleagues were not cowed by senior observers who advocated much lower values for the Hubble constant — or by theorists who believed that the Universe must be decelerating, which would make the age discrepancy even worse. They just reported what they found.

He and his colleagues improved their measurements of distances to nearby galaxies as technology permitted, and eventually the pieces came together. The modern value of  $73 \text{ km s}^{-1} \text{Mpc}^{-1}$  emerged from studies using the Hubble Space Telescope in which Huchra participated. Together with the surprising finding that the expansion of the Universe is speeding up, the age of the Universe, and the ages of the stars in it, now fit into a plausible history of cosmic evolution that began with the Big Bang 14 billion years ago.

Huchra's other outstanding contribution was to generate three-dimensional maps of the distribution of galaxies using redshifts. He began this work as a postdoc in the 1970s and pursued it for decades.

In the 1970s, conventional wisdom among astronomers held that galaxies were either in clusters or evenly distributed in 'the field' between the clusters. But Huchra, Margaret

Geller and their colleagues at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, discovered a different picture.

Earlier redshift surveys had indicated the possibility of large empty voids. As Huchra and his colleagues accumulated hundreds, then thousands, then tens of thousands of redshifts, their maps revealed that a foamy structure of voids, sheets and walls was a generic feature of the Universe. The team obtained this extraordinary picture through a confluence of insightful planning, new detector technology, creative analysis techniques and an ample dose of hard work at the telescope, much of which was supplied by Huchra.

John's energy and generosity extended far beyond his own research programme. As well as helping numerous PhD students to become successful scientists and people, he served on an astonishing number of panels and committees. He was president of the American Astronomical Society from 2008 to 2010. Most recently, he had a leading role in the National Research Council's Astro2010 Decadal Review — so was key to setting the agenda for the next ten years of astronomy research in the United States. In all of these activities, John was fair, thoughtful and realistic, seeking not the perfect outcome, but a good one.

**"He was happiest in the observatory, with the controls of the telescope in his hands."**

John married late in life, and his joy with Rebecca Henderson and his pride in his son Harry made him a more complete person. Nobody worked harder at his craft, gave more of himself to his colleagues and students, and was less puffed-up by his considerable achievements than John. He was happiest in the observatory, with the controls of the telescope in his hands. On cloudy nights, he was unbeatable at 8-ball and pinochle, having misspent hours of his youth playing both. Counting cards, he said, is like counting galaxies. ■

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