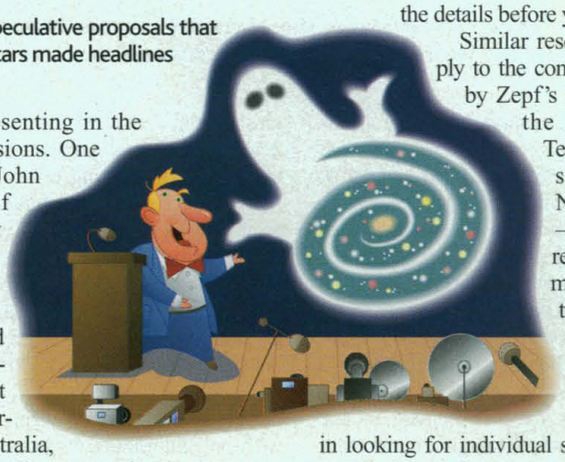
ASTRONOMY

How Dark Matter Became An Unlikely Media Star

After getting top billing at a recent astronomy meeting, speculative proposals that dark matter might lurk in unseen "ghost galaxies" or dim stars made headlines



In an old newsroom joke, a reporter approaching his deadline on a slow news day opens a drawer and takes out a sheet typed up in advance for just such an occasion. The headline reads, "Teddy Roosevelt Is Still Dead." Astronomy writers also have a story of last resort: The mystery of cosmic "dark matter"—unseen mass that affects the movements of stars and galaxies—is still unsolved. Last month, two research teams stated anew that they had observed no trace of the dark matter, although they offered new proposals for where it might be hiding. The announcement was reported from coast to coast.

The media splash had little to do with the likely scientific impact of the two modest but interesting studies. The few astronomers who are familiar with the work suggest that the teams' broader conclusions were overstated. One team claimed that undetected "ghost galaxies," consisting almost entirely of dark matter, may outnumber all ordinary galaxies. The other suggested that a galaxy's halo of dark matter may consist of myriad small stars, impossible to pick out individually. Both claims are speculative, says Vera Rubin, the astronomer at the Carnegie Institution of Washington who discovered in the 1970s that ordinary galaxies must contain dark matter. "If you can't see something," she says, "it's very hard to make statements about how many of them exist."

Wide coverage was encouraged, however, by the teams' placement in the prime slot of a series of press conferences at an American Astronomical Society (AAS) meeting in Austin, Texas. A roomful of reporters on deadline heard the presentations and hurried off to file stories, which often suggested a link between the virtually unrelated projects. The team members themselves now say they are uncomfortable with at least some of the press coverage. But the AAS press officer, Stephen Maran, who is also an astronomer at NASA's Goddard Space Flight Center, does not believe the promotional effort overplayed the findings. "I think we made the right arrangements for this press conference," he says.

The transformation of minor results into a major news event began last fall when the two teams of respected astronomers each submitted short abstracts to the AAS meeting organizers, describing research they would be presenting in the scientific sessions. One abstract, by John Kormendy of the University of Hawaii's Institute for Astronomy in Manoa and Kenneth Freeman of Mount Stromlo Observatory in Australia, was titled "Scaling Laws for Dark Matter Halos in Late-Type and Dwarf Spheroidal Galaxies." Another, by Michael Liu of the University of California, Berkeley, Stephen Zepf of Yale University, and others, came with the heading "Weighing the Stellar Content of NGC 5907's Dark Matter Halo."

The presentations were assigned to separate sessions at the scientific meeting and might have remained obscure outside a few specialists had the abstracts not caught the eye of the AAS press office. Explains Kormendy: "I got an e-mail from Steve Maran saying, 'I read your abstract and it sounds interesting; would you like to give a press conference?' " Maran—who is often praised for his success in publicizing astronomy—also contacted Liu, and he eventually notified both teams that they would be sharing the meeting's first press conference, at 9 a.m. on 6 January.

In the press kit distributed to science journalists around the world, Maran predicted that the dark matter press conference would be one of "the two likely largest newsmakers" of the entire AAS meeting. And in a tease that was sure to pump up press attendance, he added that the briefing would discuss "the possible existence of what are being termed 'ghost galaxies.' "

Kormendy and Freeman built on earlier studies of how galaxies rotate, a clue to the amount and distribution of their dark matter. Such studies show that larger and more luminous galaxies often have a lower proportion of dark matter than smaller and dimmer ones. But the team went further, using what Zepf calls a highly uncertain reconstruction of the dark matter content in seven small, diaphanous galaxies called dwarf spheroidals to push the trend of rising dark matter content in dimmer galaxies to an extreme. Practically invisible galaxies, containing almost all dark matter, "may outnumber all luminous galaxies combined," according to a viewgraph Kormendy showed at the press conference. "I wouldn't call it conclusive," said Zepf, who chaired the session at which Kormendy gave his technical talk. "You'd want to work out all the details before you believe that."

Similar reservations may apply to the conclusions presented by Zepf's team, which used the Hubble Space Telescope (HST) to study the galaxy NGC 5907's "halo"—a surrounding region where dark matter is thought to reside. Another group had seen a strange glow from the halo in the early 1990s, but in looking for individual sources that might explain it, Zepf's team saw nothing. If ordinary stars are creating the glow, HST should have seen at least the brightest ones. The team inferred that a bizarre collection of dim, small stars is responsible and may constitute the bulk of that galaxy's dark matter.

Heather Morrison of Case Western Reserve University in Cleveland, who originally observed NGC 5907's glow, says stars could still turn up in a color band different from the one Zepf's team used. "Again, this is a negative observation," says Rubin. "If you don't see something … you can read into it anything you think might be there."

Kormendy and Zepf now say that the press conference focused almost exclusively on the most speculative aspects of their work. Members of both teams say they also regret that the rapid-fire, back-to-back presentations led reporters to suggest that one set of results somehow supported the other. "I should have anticipated that people might think they're connected," says Kormendy. "I was surprised to see, in the press, the degree to which the stories were linked," adds Liu.

Maran responds that "we did not represent that both topics were closely related. … We simply hedged our bets by including two newsworthy papers on topics in the same general area." He says that he saw no inaccuracies in the news reports and has heard no objections from scientists. That may be because the bottom line in most of the coverage was unobjectionable: The mystery of the dark matter remains unsolved. Rubin, who was included in the press conference as an outside commentator, was widely quoted in an eloquently noncommittal summation. "We're still groping," said Rubin. "We're sort of in a black room doing an all-black puzzle." —JAMES GLANZ

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