

**Chairs' Corner – June 2009**  
**Hubble Telescope Repair – Bruce Balick**

TO: UW Foundation, UW Board of Deans/Chancellors, University Advancement Staff  
FROM: Daniel J. Evans, Chair, UW Foundation  
Lyn Grinstein, Vice Chair, UW Foundation  
Orin C. Smith, Immediate Past Chair, UW Foundation

Dear Friends,

On May 14, astronomy professor Bruce Balick found himself with an acute conflict of priorities. The UW Board of Regents was meeting that morning, and the agenda included the Regents' first review of proposed University budgets and tuition rates for the coming year. As chair-elect of the Faculty Senate, keenly aware of the UW's economic straits, Professor Balick needed to be there.

But as a scientist, he was riveted by another drama taking place 350 miles above the earth. Starting about 5 a.m. Seattle time, two astronauts from the space shuttle Atlantis had begun the first space walk of the long-delayed Hubble telescope repair mission, launched three days earlier. (The pilot of the mission was 1977 UW graduate Gregory Johnson.) The astronauts' first assignment: to remove the failing Wide Field Planetary Camera 2 (WFPC2), source of those stunning images we have all seen of "galaxies far, far away," and replace it with the new Wide Field Camera 3 (WFC3). For Professor Balick, part of a team of international scientists who had been working since 1998 on the design and mission of the new Camera 3, this would be a heart-stopping moment.

But he missed it. "I got up early," he recalls, "to watch the live coverage on NASA-TV. There was a bolt the astronauts couldn't loosen on the old camera, and that set back the schedule. I watched at home till the bolt released, and then I biked to the Regents meeting at the last possible moment. Craig Cole [Regents Chair] agreed that I could keep an eye on my laptop during the meeting, so I turned it on—only to learn that the new camera had already been installed, while I was on my bike!" Still, he did get to give the Regents an impromptu briefing on the Hubble mission and his own role, including his trip to Cape Canaveral for a final scientific meeting and the May 11 launch. (For a full account of the Hubble repair mission, go to [www.en.wikipedia.org/wiki/STS-125](http://www.en.wikipedia.org/wiki/STS-125) . To revisit the Hubble's gorgeous images, see [www.hubblesite.org/gallery/album](http://www.hubblesite.org/gallery/album).)

Professor Balick studies the death of stars. The Hubble, he reports cheerfully, has already toppled many long-held beliefs about stellar evolution. For 19 years, in its orbit beyond the distorting and concealing atmosphere of the earth, the Hubble has looked far deeper and earlier into the universe than any previous instrument. "The clarity of its images," he says, "revealed that we were using the wrong physics. We're still trying to find the right quantitative models to fit the observations. The Hubble has forced us to dig much more deeply and develop a far more robust understanding of the workings of the universe."

Professor Balick's involvement with the new Camera 3 dates from the late 1990s. As it became apparent that Camera 2 would eventually need to be replaced, NASA sent out a call to astronomers around the world for help in defining the scientific requirements of a new camera. What key questions should it be designed to answer? What new capabilities could it provide? Of the many astronomers who responded to NASA's call, Professor Balick was one of 12 appointed to the Scientific Oversight Committee, which was put together to have a broad representation of expertise and perspectives.

The committee asked NASA engineers to equip the new camera with far more sensitive detectors than those on WFPC2. In particular, WFC3 would be able to "see" light in the infrared, blue, violet, and ultraviolet parts of the spectrum, whereas WFPC2 could only register wavelengths visible to the eye. These unique capabilities serve a dozen or so goals the committee set for the new camera. The top three: to study how galaxies form and evolve, to track how the stars within them form and evolve, and to investigate the two great mysteries of astrophysics, dark energy and dark matter.

"Normal" matter, says Professor Balick—"things like stars, planets, you, and me"—makes up only one-sixth of the universe. "The rest has a nature we do not understand, though we can see its effects in the motions of stars. Dark energy is even weirder. In 1998 we learned that the expansion of the universe is accelerating rather than slowing down, as we had previously predicted. That tells us that ordinary energy is just a minor part of the total energy budget of the expanding universe. With the Hubble, which can look ten billion years into our cosmic past, we'll be trying to trace changes in the rate of expansion of the universe going way, way back."

Up on the Hubble, WFC3 has just been turned on, after an initial period in space to rid the camera of any terrestrial moisture that might freeze on its optics. It will undergo two months of calibration and then make its first scientific observations in August. Professor Balick and his colleagues on the Scientific Oversight Committee will not see data until the first images are released to the public, probably in September. WFC3 is expected to last at least until 2014, when the Hubble's successor, the James Webb Space Telescope, is slated for launch into an orbit a million miles on the far side of the moon—to take up the search for clues to the mysteries of dark matter and dark energy.

Asked to imagine where all this might go, Professor Balick laughs. "Research missions like this can have three outcomes. Sometimes they turn out to verify weakly supported theories. In many more cases, they rattle or overturn our established beliefs. And then there's serendipity—the things no one can anticipate. What will we learn with the refurbished Hubble Space Telescope and its new instruments? I'm not foolish enough to venture any guesses."

Dan, Lyn, and Orin

#### Looking Back

- **Contributions July 1, 2008 through May 31, 2009 total \$278,690,873.**
- The May Report of Contributions is attached and contains fundraising details.

#### Looking Ahead

- **Friday, September 11, 2009.** Foundation Board Annual Meeting, 8:00 a.m. coffee; 8:30-11:30 a.m. meeting. HUB East Ballroom.
- **Friday, January 29, 2010.** Foundation Board Meeting, 8:30 a.m. coffee; 9:00-11:00 a.m. meeting.
- **Friday, April 23, 2010.** Foundation Board Meeting, 8:30 a.m. coffee; 9:00-11:00 a.m. meeting.
- **Friday, September 10, 2010.** Foundation Board Meeting, 8:30 coffee; 9:00-11:00 a.m. meeting