

Forbes

May 13, 2002

FORBES LIFE



A Star Is Born

Astronomy belongs not only to the pros but also to gifted amateurs with new equipment.

BY SUSAN ADAMS

STEVEN MANDEL TRAINS HIS 7-INCH TELESCOPE ON A portion of the Veil Nebula, a cloud of gas 1,600 light-years away. At first he sees little more than a fuzzy blur. Then Mandel works his magic: Using an ultra-sensitive digital camera attached to the back of a telescope and wired into a computer, he starts to pull images down from the heavens.

Seven minutes later the computer screen in Mandel's private observatory reveals an intricate pattern, shot through

with what look like human veins, punctured by hundreds of glowing orbs. When his series of 15 five-minute exposures is done, he has a truly startling image: a fragment of a supernova, a star that exploded 25,000 years ago.

Mandel is an amateur astronomer—an "obsessive amateur," in his own words. With not one but two private observatories perched next to his home in the mountains above Santa Cruz, Calif., Mandel, 52, spends upwards of 100 nights a year either gazing through one of his four

Most nights it's just him and the universe: Steven Mandel in his dome.

scopes or busily imaging galaxies, nebulae and the remnants of supernovae. So consumed by his hobby is he that early in his 18-year marriage to former freelance science writer Carol Foote, the couple decided that Mandel needed an agreement restricting his stargazing time. Nowadays Foote and the couple's two sons sometimes join in.

Mandel's particular obsession is imaging: using long exposures to make pictures of celestial bodies—like his shot of the Veil Nebula supernova remnant, which cannot be seen merely by gazing through a telescope. Nor is standard photographic equipment always sufficient, since urban light pollution can wreck an image of a supernova. To mitigate the effects of such pollution, Mandel used to drag his gear, including a 30-pound telescope, 75-pound mount and two 20-pound marine batteries, to remote desert or mountain locations.

Then in the early 1990s cameras built



Glorious remnant: a fragment of the Veil Nebula captured by Mandel.

on charge-coupled devices, or CCDs, became available to amateur astronomers. These contain a silicon chip so sensitive it captures images up to 30 times faster than conventional film. CCDs are much more efficient at imaging very faint objects and are far less likely to be foiled by Earth-based light.

Now Mandel does most of his imaging right in his observatory, a simple room with a movable roof he designed and had built in 1990. The roof is connected by an elongated bicycle chain to a garage-door

motor that rolls it back at the flick of a switch. An 85-pound telescope mounted on a computerized base sits in the middle of the floor. Three years ago Mandel added a control room to house his imaging setup, which includes three computers and three monitors. Because he stargazes for as long as eight hours at a time—from after sundown until sunrise—he also has installed a space heater, a minifridge stocked with Diet Coke and a CD player that serenades him with Mozart string quartets.

A year and a half ago he decided to build a second observatory, a dome he constructed from a \$10,000 kit made by an outfit called Technical Innovations, in Gaithersburg, Md. He needed it to house his second large telescope, a \$15,000 model with the ability to capture a wider field than his other scope. Correction: He didn't need a dome, exactly. A rectangular box would have sufficed. But a dome seemed so classic, so stately. He bought it for "the romance," he says.

Most of Mandel's images come from the CCD cameras he attaches to his scopes. But desire spawns invention, and Mandel is seeking a patent on a simple, platelike device that enables him to attach a conventional 35mm Nikon lens to a digital astronomy camera. He piggybacks this unit directly on top of a scope, allowing him to produce never-before-captured wide-field images, like his striking, ghostly picture of Barnard's Loop—a huge arc of gas that covers the length of the constellation Orion.

What's startling (and perhaps difficult to comprehend) is that Mandel, with his amateur setup, is the first human being ever to have seen this sight. It's not that CCD cameras aren't used by professional astronomers; they are, and have been for some time. But professionals (or the institutions for which they work) necessarily have their own limited agendas. They can focus on only so much. Result: an infinite number of discoveries

TOOLS

The Eye of the Beholder

Amateurs can now buy stargazing equipment that rivals the gear used by professionals. Mandel's choices:

16-inch f/8.9 Ritchey-Chretien telescope by C. Brad Ehrhorn of RC Optical Systems in Flagstaff, Ariz. (rcopticalsystems.com). Designed and handmade by Ehrhorn, a captain for America West Airlines who is himself an avid amateur astronomer. Powerful enough to capture an image of a quasar that is 1 billion light-years away. Price: \$22,000.



Paramount ME telescope mount by Software Bisque of Golden, Colo.

(bisque.com). Finely tuned, with a tracking system that wires into a computer software program. Punch in your latitude and longitude; the software reads the time on your computer's clock and then displays a precise picture of the heavens. Click on the celestial body you want to view; the mount whirs the scope into position, and motors keep it fixed on a target as the Earth rotates. Price, including software: \$8,500.

—S.A.

await Mandel and every other amateur. It was two amateurs, for example, who discovered the Hale-Bopp comet in 1995.

Mandel claims that the isolation demanded by his hobby—most nights, it's just him and the universe—is one of the best things about astronomy. "It's my therapy," he sighs, and a welcome escape from his intensely people-oriented job as the owner of a corporate speech-coaching firm with 15 employees. His list of clients includes IBM, Cisco and Charles Schwab & Co.

The Internet keeps Mandel in close touch with other stargazers (his own site: galaxyimages.com). Online he met Steven Lee, the chief telescope operator at a pro-

fessional observatory in Coonabarabran, Australia. Together with an amateur astronomer friend from California, Mandel has traveled to Australia and set up a high-powered telescope, mount and CCD camera in Lee's own backyard observatory, which they've dubbed the Australian-American Imaging Station. As soon as a high-speed Internet connection becomes available in Coonabarabran, the trio plan to hook their Australian mount into Mandel's California computers so they can control the observatory remotely.

Despite all the sophistication, Mandel seems like an overgrown kid when pushing buttons and whirring his scopes

around. Indeed, his original enchantment with astronomy came at age 12, from Tom Swift books and the TV series *Science Fiction Theater*. He raised \$300 to buy his first telescope from his own little business stenciling address numbers on the curbs next to new tract houses in his San Fernando Valley, Calif. neighborhood.

Mandel's greatest thrill, he says, still comes from the simple pleasure of gazing at the night sky, whether he's using \$80,000 worth of sophisticated equipment or just looking at the summer Milky Way through a pair of cheap binoculars: "The mystery and the passion of it all is there for me. I just can't get enough." ■

Mandel

Communications

Mandel Communications, Inc.
610 Capitola Avenue
Capitola, California 95010
800-262-6335
831-475-8202
www.mandelcom.com