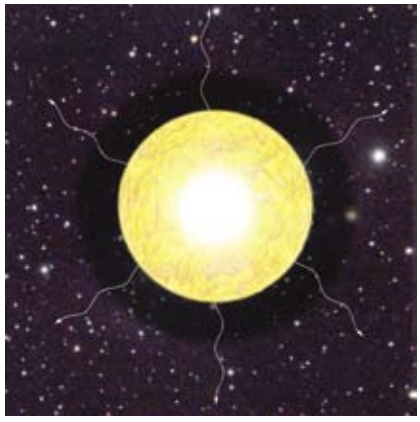
# Bang-Up Job

Astronomers spot a new type of stellar explosion.



**Brilliant move:** An artist's rendition of a new type of stellar explosion, ten times greater than previously observed, that could shed light on the universe's first stars.

**LAST DECEMBER**, scientists announced the discovery of one of the biggest explosions ever observed: An extremely massive star blew apart more than a billion light years away, spewing radioactive nickel and glowing with a luminosity about 30 billion times that of our Sun.

The team, which included researchers from Berkeley and Lawrence Berkeley National Laboratory, believes the brilliant display was an example of a phenomenon called a pair-instability supernova, predicted by theorists four decades ago but never before backed by clear evidence. "It's an entirely new type of explosion," says Peter Nugent, an astrophysicist at the Berkeley Lab. Nugent's group first spotted the supernova, dubbed 2007bi, in April 2007 and determined it shone about ten times more intensely than the brightest type of supernova they normally encounter.

After Berkeley astronomers gathered more data, an international collaboration of researchers observed the supernova for another one-and-a-half years. The team concluded that the star, initially about 200 times the mass of our Sun, did indeed undergo a pair-instability explosion. Gravity increased the density and temperature inside the star's core, eventually allowing the star to fuse hydrogen atoms together into helium, then carbon, and finally into oxygen. Once the core became mostly oxygen, it got so hot that high-energy photons turned into electrons and their corresponding antimatter particles, positrons. The loss of photons caused the interior to collapse, triggering a thermonuclear explosion that released huge amounts of energy.

Until now, some doubted whether such massive stars even existed, says Berkeley astronomer Alex Filippenko, whose team took some of the initial observations. They were more likely to form early in the universe's 13.7 billion-year history, when conditions favored the creation of ultra-massive stars. But this relatively young star came into being less than 2 billion years ago in a tiny dwarf galaxy that bore chemical similarities to the early universe.

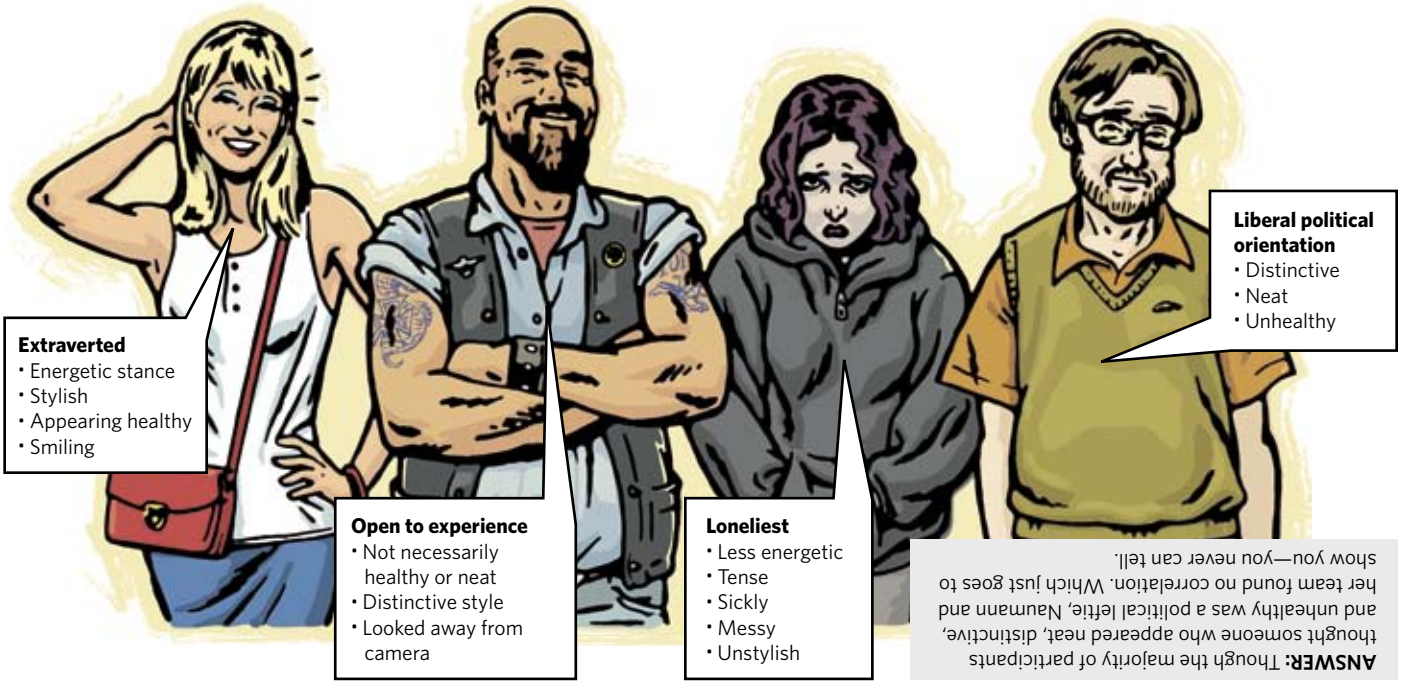
Seeing 2007bi gives scientists a better idea of what to look for in searching for the universe's first stars, some of which may have undergone similar explosions, says Filippenko. These early supernovae would have seeded the Universe with heavy elements such as iron, which were later incorporated into other stars and eventually living beings. "If it wasn't for these exploding stars, we wouldn't be sitting here having this conversation," he says. "So understanding that process leads us to an appreciation of how we came to be."

*—Roberta Kwok*

## Figure 1.0

# Field Guide to Earthlings Spot the personality traits.

**A NEW BERKELEY STUDY DEMONSTRATES** that our first impression of someone is often spot on—except, er, when it's not. Psychologist Laura Naumann and her team identified a number of physical traits that, for the most part, accurately predict certain personality traits. In at least one case, however, study participants' expectations of how a certain kind of person would look were wrong. We present a selection based on her findings below. One of these exemplifies the case of false assumptions. Answer below.




**ANSWER:** Though the majority of participants thought someone who appeared neat, distinctive, and unhealthy was a political leftie, Naumann and her team found no correlation. Which just goes to show you—you never can tell.

FASCINATING

SUPERNOVA: COURTESY OF GAL-YAM ET AL. AND LAWRENCE BERKELEY NATIONAL LABORATORY



ILLUSTRATION BY ERIC LARSEN