



Look up at the sky on a moonless night, and what do you see? If you are feeling poetic, you see “the lovely stars, the forget-me-nots of the angels” (Henry Wadsworth Longfellow). In a different mood—or if you’ve spent much time around Caltech—you might be more likely to say that you see galaxies, nebulae, quasars, binary star systems, supernovae. But let’s face it: to the naked eye, it’s just stars and more stars, so matchless in their beauty that it is easy to imagine that we see the entire universe spread out before us.

The past century of astrophysics has taught us that what we see is but a tiny fraction of what is out there. Dark matter and energy compose 96 percent of our universe. “Bright matter”—the stuff we see—is no more than 1 percent. The rest lies in the intergalactic medium (IGM): what Caltech physicist Chris Martin calls “dim matter.”

Over the past several decades, theorists have predicted that the dim matter of the IGM is a “cosmic web,” with gas flowing through its filaments to feed matter into galaxies. Now, courtesy of Caltech’s Cosmic Web Imager (CWI), designed and built by Martin and his team, we have seen it. Mounted on the 200-inch Hale Telescope at the Palomar Observatory, the CWI has already delivered some appetite-whetting images of the IGM swirling around a quasar and a Lyman-alpha blob (a protogalaxy filled with hydrogen gas).

A new, improved version of the CWI is being prepared for the 10-meter telescopes at the W. M. Keck Observatory in Hawaii. Using these CWI enhancements, Martin hopes to point the imager at what looks like nothing, and see there the filaments of the cosmic web spread far and wide. —*CE*