Electromagnetic Spectrum

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Scientists learn much about the world by splitting things apart. A geologist can split rocks, a botanist can split seeds, and a physicist can split atoms. About the only thing an astronomer can split is a beam of light, but even that reveals a great deal -- from the temperature of a star to the final moments of matter falling into a black hole.

Our eyes perceive the light from a star as a single color. But instruments split the light into individual wavelengths, forming a rainbow of colors. The intensity of each wavelength tells astronomers how hot the star is, what it's made of, how it's moving, and whether it has companions, like other stars or even planets.

Visible light is just one of the forms of energy that make up the electromagnetic spectrum. Other forms include infrared and radio waves, which have a longer wavelength than visible light, and ultraviolet, X-rays, and gamma rays, which are SHORTER than light.

Telescopes on the ground or in space detect these forms of energy and split them into THEIR component wavelengths, too. Each type of energy tells us about the environment in which it was created. Infrared, for example, comes from relatively cool objects like gas clouds and planets. And X-rays come from some of the most violent objects in the universe, like disks of hot gas spiraling into black holes.

By splitting each form of energy, astronomers build a more complete understanding of the universe -- one wavelength at a time.

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