From the Big Bang to Now:
Observing the Universe
with the James Webb Space Telescope

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Abstract:
The James Webb Space Telescope (JWST) is the next giant step in space astronomy, planned for launch in 2018. It is far larger and more powerful than the great Hubble Space Telescope, so large that it must be folded up into the top of the rocket for launch. It will observe at wavelengths from 0.6 to 28 m, i.e. from visible red wavelengths emitted by stars, to the mid-infrared wavelengths emitted by people, and will have the sensitivity to observe the heat of a bumblebee if it were orbiting at the distance of the Moon. It will carry cameras to take pictures, and spectrometers to analyze the physics, chemistry, and motions of distant stars, galaxies, black holes, and even planets. I will show how Hubble discovered the expanding universe back in 1929, how we measured the cosmic heat with the COBE satellite (and earned a Nobel Prize for NASA), and how the JWST will extend our knowledge even farther. The JWST can analyze Earth-like planets orbiting other stars, and determine whether they have enough water to have oceans. I will conclude with a few speculations about the future that we might encounter, and whether we can travel to the stars.