

## ASTR 160 – Frontiers and Controversies in Astrophysics

### Update 3 – Do Black Holes Spin?

1. Dark Energy vs. Dark Matter in the Universe. Image credit: Spectra and HST Light Curves of Six Type Ia Supernovae at  $0.511 < z < 1.12$  and the Union2 Compilation R. Amanullah, et al., The Astrophysical Journal, 2010.

4. 2011 Nobel Prize for Physics: Saul Perlmutter. Image credit: Lawrence Berkeley National Lab.

Brian P. Schmidt. Image credit: Belinda Pratten, Australian National University.

Adam G. Reiss. Image credit: Scanpix/AFP

5. Cosmic Microwave Background (CMB). Image credit: Smoot Group Astrophysics and Cosmology, [http://aether.lbl.gov/www/projects/cobe/COBE\\_Home/DMR\\_Images.html](http://aether.lbl.gov/www/projects/cobe/COBE_Home/DMR_Images.html) (Accessed June 2012)

Distribution of Galaxies (2DF survey). Image credit: Universe Today, <http://www.universetoday.com/85530/examining-the-great-wall/> (Accessed June 2012)

11. James Webb Space Telescope. Image Credit: NASA, <http://www.nasa.gov> (Accessed June 2012)

13. Wide Field Infra-Red Space Telescope (WFIRST). Image Credit: NASA, , <http://www.nasa.gov> (Accessed June 2012)

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