

Course project: self-study topics

Below are sample topics for course projects with some starting references.

- **Neutrino masses and oscillations: their role in astrophysics**
CB: Appendix C
<http://arxiv.org/abs/hep-ph/0510213v2>
<http://arxiv.org/abs/hep-ph/0004032>
- **Planck, AMS and IceCube missions: what do we learn about astrophysics/Cosmology from them?**
http://www.esa.int/Our_Activities/Space_Science/Planck
<https://ams.nasa.gov>
<https://icecube.wisc.edu>
- **Primordial gravitational waves – what do we learn from them about early universe?**
<https://arxiv.org/abs/1605.01615>
<https://arxiv.org/pdf/1004.2504.pdf>
- **Anomalies of the Large Scale Structure vs Standard Cosmological Model: the Cosmic Axis of Evil, the Dark Flow, the Great Wall, the Great Attractor etc**
http://lambda.gsfc.nasa.gov/product/map/current/map_bibliography.cfm
- **Vacuum Catastrophe: crisis of Fundamental Physics?**
<http://www.physics.arizona.edu/~rafelski/PS/0906ParisTalk.pdf> ;
<http://arxiv.org/abs/1005.3241> ; <http://arxiv.org/abs/0801.0052v1> ;
<http://www.physics.arizona.edu/~rafelski/Books/StructVacuumE.pdf> ;
<https://indico.cern.ch/getFile.py/access?contribId=34&sessionId=25&resId=0&materialId=slides&confId=181298>
- **Cosmic Microwave Background polarisation**
<http://cosmology.berkeley.edu/~yuki/CMBpol/CMBpol.htm>
- **Paradoxes of Cosmology: Bentley, Fermi, Heat death, Olbers paradoxes**
e.g. Wesson, P. S. *Astrophysical Journal*, Part 1 (ISSN 0004-637X), vol. 367, Feb. 1, 1991, p. 399-406 ;
<http://abyss.uoregon.edu/~js/cosmo/lectures/lec28.html>;
<http://www.aps.org/publications/apsnews/200507/history.cfm>
- **Wormholes in Cosmology**
http://www.physics.indiana.edu/~nipoplaw/PLB_687_110.pdf

- **Shape of the Universe**
<http://www.ams.org/notices/199811/cornish.pdf>
- **Loop Quantum Cosmology**
<http://igpg.gravity.psu.edu/people/Ashtekar/articles/rovelli03.pdf>
<http://arxiv.org/abs/gr-qc/0210094>
<http://relativity.livingreviews.org/Articles/lrr-2005-11/>
<http://arxiv.org/abs/0812.0177>
- **Grand Unified Theories: implications for Cosmology**
<http://www-ekp.physik.uni-karlsruhe.de/~deboer/html/Forschung/review3.pdf>
<http://rsta.royalsocietypublishing.org/content/307/1497/121>
- **Topological Defects in the Early Universe**
e.g. CB: Chapter 12 etc