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# 国台学术报告 NAOC COLLOQUIUM

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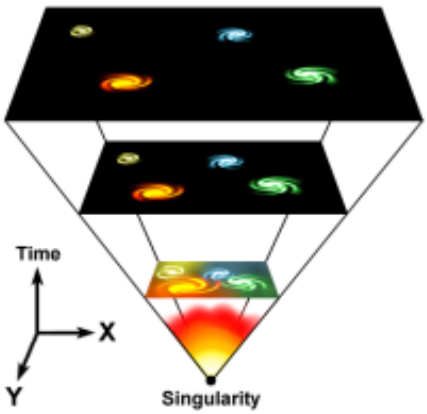
**TIME: Wednesday, 2:30 PM, Nov. 20 2013 LOCATION: A601 NAOC**

# A Unique Metric for Cosmology


## Prof. Fulvio Melia (University of Arizona)


Fulvio Melia is Professor of Physics, Astronomy, and the Applied Math Program at the University of Arizona, in Tucson, and John Woodruff Simpson Fellow at Amherst College, a chair formerly held by the Nobel laureate Neils Bohr and noted American Poet Robert Frost. Born in Gorizia, Italy, he was raised in Melbourne and received his BSc and MS degrees from Melbourne University. He completed his graduate studies at MIT, receiving a PhD for research on the physics of strong gravitational and magnetic fields. Since then, he has been a Presidential Young Investigator (under Ronald Reagan) and an Alfred P. Sloan Research Fellow. He has received numerous international awards for his research and scholarship, and has frequently been a visiting professor at universities in Australasia and in Europe. He has published over 270 journal articles in high-energy astrophysics, including topics on black holes, relativistic matter, and cosmology. He is also the author of 6 books, most recently Cracking the Einstein Code, the story of how Roy Kerr and his colleagues produced one of the most famous and important solutions to Einstein’s equations of General Relativity.

## Abstract





The standard model of cosmology is based on the Friedmann-Robertson-Walker (FRW) metric. Often written in terms of co-moving coordinates, this elegant and highly practical solution to Einstein’s equations is based on the Cosmological principal and Weyl's postulate. But not all of the physics behind such symmetries has yet been recognized. We invoke the fact that the co-moving frame also happens to be in free fall to prove that the FRW metric is valid only for a medium with zero active mass. In other words, the spacetime of a perfect fluid in cosmology can be correctly written as FRW only when its equation-of-state is rho + 3p = 0, in terms of the total energy density rho and total pressure p. There is now ample observational evidence supporting this conclusion.


*All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.*

You are welcome to nominate speakers to Weimin Yuan (wmy@nao.cas.cn), Mei Zhang (zhangmei@bao.ac.cn), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn), Shude Mao (smao@nao.cas.cn)