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X-ray Spectroscopy of Hot Plasma in and around Galaxies



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Q. Daniel Wang is a Professor in the Department of Astronomy at the University of Massachusetts at Amherst. He received his Ph.D. in Astronomy in 1990 from Columbia University. He was awarded the ASP Robert J. Trumpler Award for Outstanding North American Ph.D Dissertation Research in Astronomy. He was then an Edwin P. Hubble postdoctoral fellow at University of Colorado and later a Lindheimer fellow at Northwestern University. He was also a member of the Institute for Advanced Study at Princeton and is the Siyuan Visiting Chair Professor at Nanjing University. Recently, he served on the Galactic Neighborhood Frontier Science Panel of Astro 2010 - the Decadal Survey on Astronomy and Astrophysics. He has published about 120 research papers in refereed journals, including four in Nature as the 1st author. His current research focuses on the hot interstellar and intergalactic media, the feedback and evolution of galaxies, and galactic nuclear regions. He mainly uses infrared, ultraviolet, and X-ray observations to conduct these studies.

Abstract

Much of the baryon matter in the present universe is believed in the form of diffuse hot plasma in and around galaxies. However, little is so far known about the actual properties of this plasma. I will review recent spectroscopic studies of the plasma, based chiefly on X-ray grating data from Chandra and XMM-Newton. The X-ray absorption line spectroscopy has led to the first characterization of the spatial, thermal, chemical, and kinetic properties of the plasma in our Galaxy. The plasma is concentrated around the Galactic bulge and disk on scales of a few kpc. The column density of the plasma on larger scales appears to be at least an order magnitude smaller, indicating that it cannot account for the bulk of the missing baryon matter predicted for the Galactic halo according to the standard cosmology. Similar results have also been obtained for other nearby galaxies. Furthermore, a substantial fraction of diffuse soft X-ray emission observed in nearby galaxies cannot arise from optically-thin thermal plasma and may originate in charge exchange at the interface with neutral gas, as indicated by the strong forbidden lines of the K α triplets of He-like ions. In general, the bulk of the mass, energy, and metals from the stellar feedback is likely gone with winds in the galaxies. These galactic winds can have profound effects on the galactic ecosystem and evolution.



All are welcome! Tea, coffee, biscuits will be served at 2:45

You are welcome to nominate speakers to Shude Mao (shude.mao@gmail.com), Licai Deng (licai@bao.ac.cn), Xuelei Chen (xuelei@cosmology.bao.ac.cn).