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The CMB Dipole: Eppur Si Muove

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The largest temperature anisotropy in the cosmic microwave background (CMB) is the dipole. The simplest interpretation of the dipole is that it is due to our motion with respect to the rest frame of the CMB (with debate over the possibility of alternative explanations). As well as creating the $\ell = 1$ mode of the CMB sky, this motion affects all astrophysical observations by modulating and aberrating sources across the sky. It can be seen in galaxy clustering, as well as in principle through a dipole-shaped acceleration pattern in quasar positions. Additionally, the dipole modulates the CMB temperature anisotropies with the same frequency dependence as the thermal Sunyaev-Zeldovich (tSZ) effect, and so these modulated CMB anisotropies can be extracted from the tSZ maps produced by Planck. I will discuss this novel way of measuring our motion with respect to the CMB frame, as well as discussing other signatures that may be possible to measure in future.

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