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Searching for Dark Matter at the Cosmic Dawn

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Current and upcoming 21-cm measurements during the cosmic dawn can provide a new arena on the search for the cosmological dark matter. This era saw the formation of the first stars, which coupled the spin temperature of hydrogen to its kinetic temperature—producing 21-cm absorption in the CMB. The strength of this absorption acts as a thermostat, showing us if the baryons have been cooled down or heated up by different processes. In particular, during the cosmic dawn, the baryon-dark matter fluid is the slowest it will ever be, making it ideal to search for dark matter elastically scattering with baryons through massless mediators, such as the photon. I will describe how dark-matter particles with an electric millicharge can significantly alter the baryonic temperature, and thus explain the anomalous 21-cm depth observed by the EDGES collaboration.

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