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## Constraining long-lived dark sector particles with Lyman-alpha and CMB

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In this talk [based on 2602.10078], I will show how measurements of the intergalactic medium (IGM) temperature from the Lyman- $\alpha$  forest can be used to constrain long-lived dark sector particles with lifetimes larger than  $10^{16}$  s. Such particles deposit energy into the IGM through decays to Standard Model states, thereby modifying its late-time thermal history. I will also revisit constraints on these models from Planck measurements of the optical depth to reionization, and demonstrate that Lyman- $\alpha$  bounds provide a complementary window to those from the CMB. The resulting model-independent constraints can be reinterpreted across a wide range of decaying hidden-sector scenarios, including evaporating primordial black holes and dark photons.

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