Towards Econophysiology

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Analogies between economics and cellular physiology have long been noted, but whether the mathematical structure of economic theory applies to cells has remained unclear. In this talk, I will first introduce the relevant biology for physicists, drawing on our recent work on cellular resource allocation [1]. I will then show that cellular resource allocation admits an exact mapping to general equilibrium theory: the proteome allocation that maximizes growth is a competitive equilibrium, and a decentralization theorem shows how this global optimum can be supported by local prices rather than imposed by central control. Because the correspondence is structural rather than merely analogical, concepts from economic theory can be translated into cellular physiology, while cellular systems provide a new physical setting in which to examine economic ideas.

[1] Thiermann et al., *Science* (2026); 10.1126/science.aeb6410
[2] S. Jun and A. Bisin, *in preparation*.