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ECH capacities and fractals of infinite staircases of 4D symplectic embeddings

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The ellipsoid embedding function of a symplectic manifold measures the amount by which the symplectic form must be scaled in order to fit an ellipsoid of a given eccentricity. It generalizes the Gromov width and ball packing numbers. In 2012 McDuff and Schlenk computed the ellipsoid embedding function of the ball, showing that it exhibits a delicate piecewise linear pattern known as an infinite staircase. Since then, the embedding function of many other symplectic four-manifolds have been studied, and not all have infinite staircases. We will classify those symplectic Hirzebruch surfaces whose embedding functions have an infinite staircase, and explain how our work provides a blueprint for other targets. Based on work with Magill and McDuff and work in progress with Magill and Pires.

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