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Detection of zeptojoule microwave pulses using an electrothermal bifurcation JOONAS GOVENIUS, RUSSELL LAKE, KUAN TAN, MIKKO MÖTTÖNEN, Department of Applied Physics, Aalto University, Finland — We utilize electrothermal feedback for the threshold detection of weak 8.4 GHz microwave pulses containing approximately $200 \times h \times (8.4 \text{ GHz}) \approx 1.1 \times 10^{-21}$ J of energy. The feedback couples the electrical and thermal degrees of freedom in the central component of our detector, a metallic nanowire that absorbs the incoming microwave radiation and transduces the temperature change into a radio-frequency electrical signal. We can tune the feedback in situ, which provides access to both positive and negative feedback regimes with rich nonlinear dynamics. In particular, strong positive feedback leads to the emergence of two metastable electron temperature states in the millikelvin range. We use these states in the threshold detection protocol.

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