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Higher-dimensional catastrophes in nonlinear Compton scattering.[1] VASILY KHARIN, Helmholtz Institute Jena, DANIEL SEIPT, Lancaster University, SERGEY RYKOVANOV, Helmholtz Institute Jena — The Compton scattering of the light on the accelerated electron beam is a valuable tool for generating tunable wide range X- and γ-radiation.However, the cross-section of the scattering is relatively low. That is, in order to obtain bright X-rays one naturally may consider increasing the intensity of the incident light. Passing to relativistic values of laser intensity significantly changes scattering mechanism. Precise QED analysis of the scattered spectra leads to the study of the corresponding elements of S-matrix. Evaluation is usually performed numerically (except cases of specific pulse shapes and scattering angles). We argue that the problem of extracting the scattered spectra in nonlinear Compton scattering of the pulse can be reformulated in terms of studying properties of projection map of specific surfaces associated to the pulse. They are stable with respect to initial conditions, and the brightest regions of the spectrum appear to be in correspondence with the singularities of the projection map, also known as caustics in pure mathematics, diffraction optics and cosmology.

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