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Plasmon-induced Hot Carriers in Metallic Nanoparticles[1] JUN LIU, ALEJANDRO MANJAVACAS, VIKRAM KULKARNI, PETER NORDLANDER, Rice Univ, LANP TEAM — Plasmon-induced hot carrier formation is attracting an increasing research interest due to its potential for applications in photocatalysis, photodetection and solar energy harvesting. Here [1] we develop a theoretical model for the plasmon-induced hot carrier process and apply it to spherical silver nanoparticles and nanoshells. We show that the inclusion of many-body interactions has only a minor influence on the results. Using the model we calculate the rate of hot carrier generation, finding that it closely follows the spectral profile of the plasmon. Our analysis reveals that particle size and hot carrier lifetime play a central role in determining both the production rate and the energy distribution of the hot carriers. We characterize the efficiency of the hot carrier generation process by introducing a figure of merit that measures the number of high energy carriers generated per plasmon. Furthermore, we analyze the spatial distribution and directionality of these excitations. [1] A. Manjavacas, J. G. Liu, V. Kulkarni, P. Nordlander ACS Nano (2014)

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