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About the damage mechanisms of thin targets exposed to high-power particle beams

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Thin targets, in the form of wires, stripes, or foils, are often used in accelerators to measure the properties of particle beams. Motivation for a small thickness, typically between several and to hundred micrometers, is diverse and depends on a particular case. For instance, small diameters of wires allow for precision measurement because it is probing a small fraction of the beam transverse profile. In case of high-power beams, the critical argument is small energy deposits and good cooling because of the large surface-to-volume ratio. In certain beam conditions, the temperature of the target can be very high and lead to thermal damage. This paper attempts to give an overview of the conditions under which the breakage occurs and the damage mechanisms for various materials.

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