# Into how many pieces does a balloon burst?

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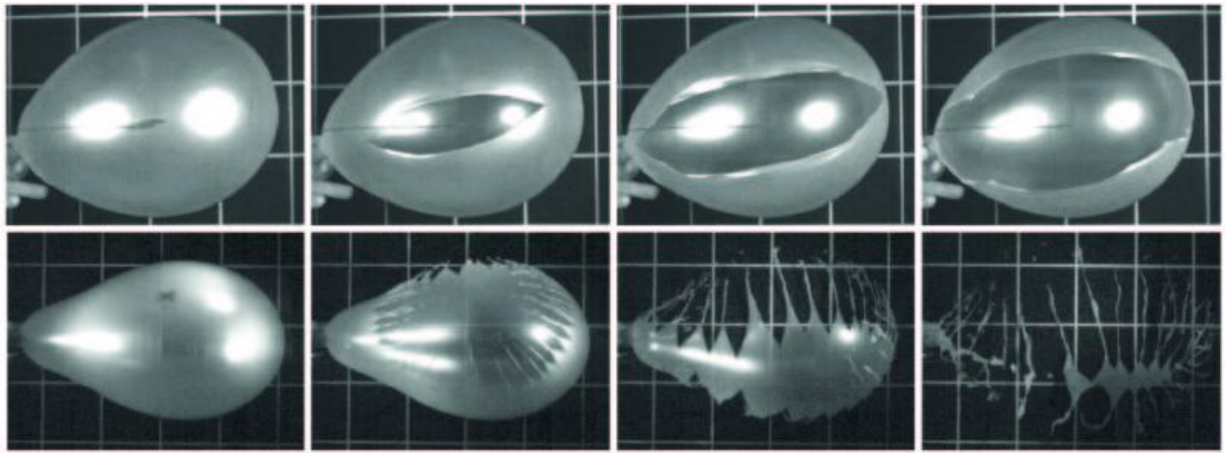

Picture : The two explosion mechanisms of a rubber balloon. Top line: opening mechanism of a moderately inflated balloon. A crack propagates across the membrane, finally splitting it into two. Bottom line: a highly tensed balloon bursts into a large number of long shreds. The time interval between each image is 0.3 ms. Credit: Sébastien Moulinet

A moderately inflated rubber balloon pricked with a needle bursts into two large fragments. However, if you inflate it until it bursts spontaneously, you get dozens of shreds.

Now, Sébastien Moulinet and Mokhtar Adda-Bedia at the Laboratoire de Physique Statistique (CNRS/UPMC/ENS/Université Paris Diderot) have explained this phenomenon: when a crack propagating across the surface of a balloon reaches a critical speed, it becomes unstable and splits into

two new cracks.

It is this mechanism of proliferating cracks that causes the balloon to burst into shreds. The work, published in *Physical Review Letters*, sheds light on the fragmentation processes in materials subjected to impacts or explosions.

**More information:** Popping Balloons: A Case Study of Dynamical Fragmentation, *Phys. Rev. Lett.* 115, 184301 – Published 30 October 2015. dx.doi.org/10.1103/PhysRevLett.115.184301

Philip Ball. Two Modes of Balloon Bursting Revealed, *Physics* (2015). DOI: 10.1103/Physics.8.105

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