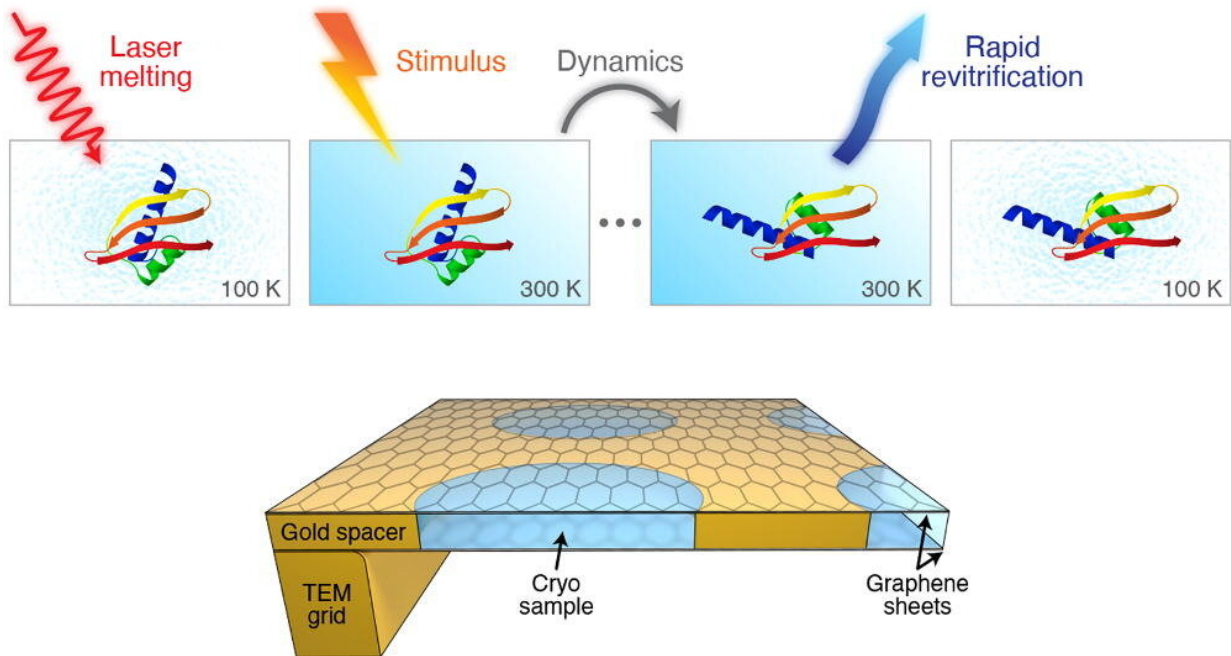


# Laser improves the time resolution of CryoEM

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Graphical abstract. Credit: DOI: 10.1016/j.cplett.2021.138812

In 2017, Jacques Dubochet, Joachim Frank, and Richard Henderson won the Nobel Prize in Chemistry for their contributions to cryo-electron microscopy (cryoEM), an imaging technique that can capture pictures of biomolecules such as proteins with atomic precision.

In cryoEM, samples are embedded in vitreous ice, a glass-like form of

ice that is obtained when water is frozen so rapidly that crystallization cannot occur. With the sample vitrified, high-resolution pictures of their molecular structure can be taken with an [electron microscope](#), an instrument that forms images using a beam of electrons instead of light.

CryoEM has opened up new dimensions in [life sciences](#), chemistry, and medicine. For example, it was recently used to map the structure of the SARS-CoV-2 spike protein, which is the target of many of the COVID-19 vaccines.

Proteins constantly change their 3D structure in the cell. These conformational rearrangements are integral for proteins to perform their specialized functions, and take place within millionths to thousandths of a second. Such fast movements are too fast to be observed in real time by current cryoEM protocols, rendering our understanding of proteins incomplete.

But a team of scientists led by Ulrich Lorenz at EPFL's School of Basic Sciences has developed a cryoEM method that can capture images of protein movements at the microsecond (a millionth of a second) timescale. The work is published in *Chemical Physics Letters*.

The method involves rapidly melting the vitrified sample with a laser pulse. When the ice melts into a liquid, there is a tunable time window in which the protein can be induced to move in the way they do in their natural liquid state in the cell.

**More information:** Jonathan M. Voss et al, Rapid melting and revitrification as an approach to microsecond time-resolved cryo-electron microscopy, *Chemical Physics Letters* (2021). [DOI: 10.1016/j.cplett.2021.138812](https://doi.org/10.1016/j.cplett.2021.138812)

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