Supplementary Materials for

**Applications and limits of time-to-energy mapping in protein crystal diffraction using energy-chirped polychromatic XFEL pulses**

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**Video S1**: simulated frames for the central 20 fs of the SwissFEL pulse labeled with X-ray time of arrival. The simulated diffraction extends to a resolution of 1.5 Å.

**Video S2**: simulated frames for the central 20 fs of the SwissFEL pulse labeled with X-ray time of arrival. The reflection is shown.

**Video S3**: on the left, cumulative simulated frames for the central 20 fs of the SwissFEL pulse labeled with X-ray time of arrival at the crystal. Different energy contributions are colored based on their time of arrival. On the right, cumulative simulated frames for a hypothetical 10% chirp. As a simulation for 10% chirp at SwissFEL is not available, it is shown without specific time assignments. The reflection is shown.