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Integrative structural biology applied to virus infection

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The IBS hosts a number of state of the art structural biology platforms that are accessible via the national FRISBI and the European Instruct programs providing technician-supported user access to instrumentation including cell imaging, cryo electron microscopy and NMR. Furthermore, the IBS participates in the operation of the ESRF CM01 electron microscopy facility equipped with a Titan Krios cryo-electron microscope (cryoEM) for single particle experiments. Construction of a second cryo electron microscopy platform at ESRF, CM02 is currently underway, which will be equipped with a Titan Krios electron microscope for single particle and cryo electron tomography experiments. CM02 will be operated as a French CRG beam line by IBS starting at the end of 2023. In addition, IBS operates the CRG crystallography beam line FIP-2 on the Bending Magnet section 07 (BM07) of the ESRF for multiwavelength anomalous diffraction experiments and in situ (in plate) crystal screening and data collection. Together with the ESRF, IBS runs the icOS Lab dedicated to optical spectroscopy experiments, such as UV/vis absorption, fluorescence (soon available on MASSIF-3 and FIP-2), and Raman spectra (soon on ID30B) of protein crystals.

Here I will present two examples of integrative structural biology approaches applied to enveloped virus host interaction. First, I will discuss vaccine development against SARS CoV-2. Although the current epidemic of SARS CoV-2 seems to slow down, there is a high need for vaccines that can provide broad protection against current or newly arising variants of concern (VOCs). Secondly, I will present structural biology approaches to understand the cellular machinery called ESCRT that is recruited by many enveloped viruses to catalyze the release of newly formed enveloped viruses from host cells.

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Primary author: WEISSENHORN, Winfried (University Grenoble Alpes)

Presenter: WEISSENHORN, Winfried (University Grenoble Alpes)

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