## Fully Funded PhD project

# NanoViro

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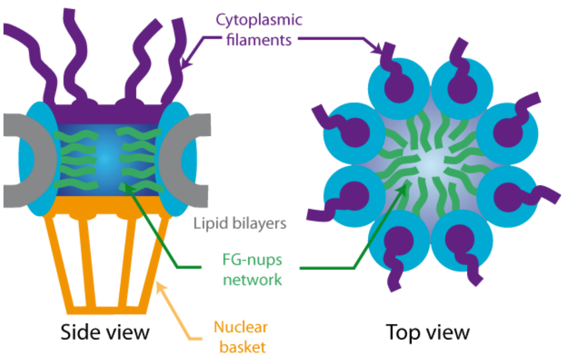
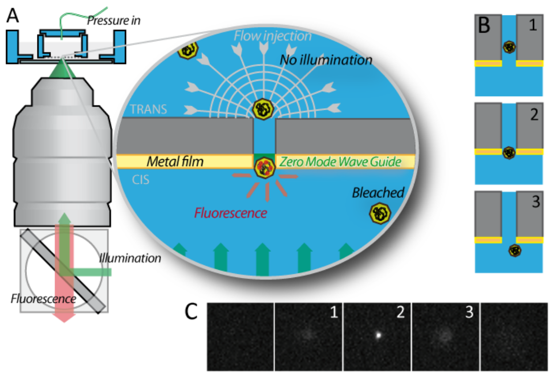
The detection of emerging viral infections is now a major public health issue. In addition, the production of viruses in large quantities for genetic therapies requires long and inefficient filtration steps.

Here we propose to use tools from nanofluidics to filter and detect viral particles. Our approach is mimetic of a biological pore, the nuclear pore (Figure - left). The latter has exceptional selectivity due to the presence of intrinsically unstructured proteins that form a dynamic gel within its central channel [1]. We have previously grafted hydrophobic artificial polymers onto nanoporous membranes. We have shown that this grafting makes it possible to reproduce the selectivity of the natural pore.

In this interdisciplinary PhD project between physics, biology and chemistry, we propose to use membranes functionalized by peptide units or glycosylations with a strong affinity for the viruses to be detected. They will allow us to measure the transport of viruses at the scale of the single particle in real time using a near-optical field method (ZMW, Figure - right) developed in the laboratory [2,3]. We will extract the energy barrier corresponding to the translocation of the virus and thus we will detect the specific signature of each viral type.

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3. Zero-Mode Waveguide Detection of DNA Translocation Through FIB-organised Arrays of Engineered Nanopores. Auger T, Bourhis E, Donnez J, Durnez A, Di Meglio J-M, Auvray L, Montel F, Yates J, Gierak J. **Microelectronic Engineering** 187, 90-94 (2018)