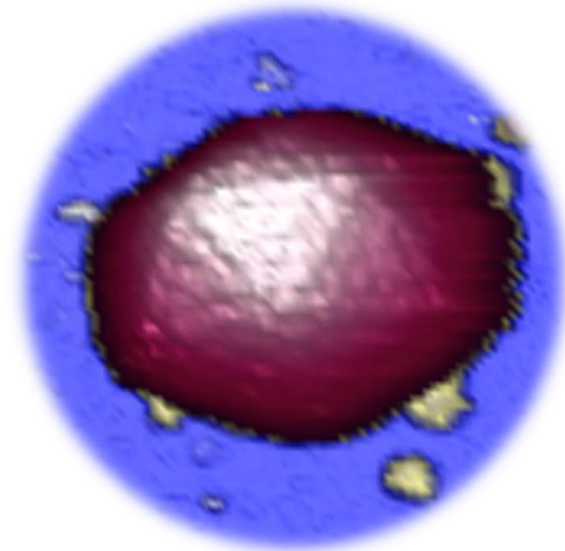
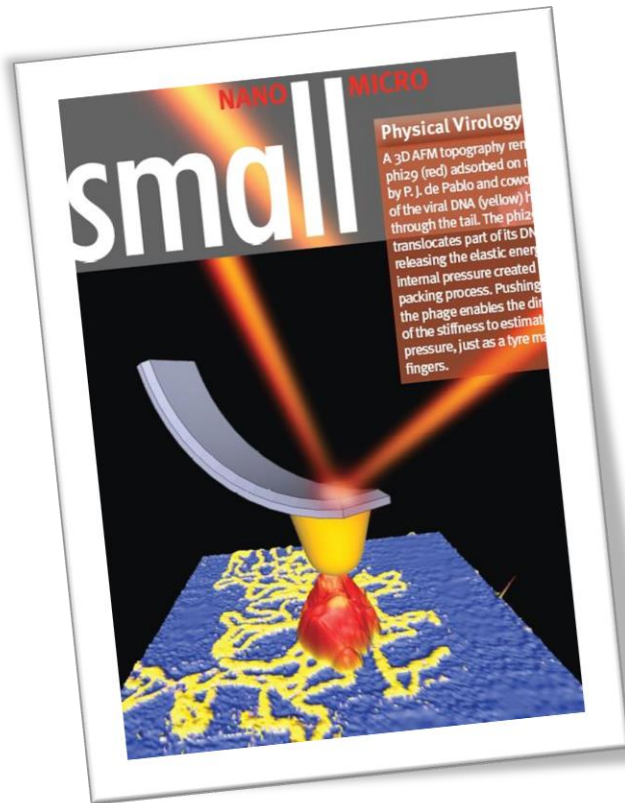


Department Seminar

Physical Virology with atomic force and fluorescence microscopies: exploring the biophysics of individual virus particles

Pedro J. de Pablo



Jueves 20 de abril de 2023 12:00 h

PRESENCIAL + ONLINE

(sala de Seminarios
del Departamento C03, 5 planta)

MS-TEAMS "Seminarios
del Departamento FMC"

Physical Virology with atomic force and fluorescence microscopies: exploring the biophysics of individual virus particles

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The basic architecture of a virus consists of the capsid, a shell made up of repeating protein subunits, which packs, shuttles and delivers their genome on time at the right place. Viral particles are endorsed with specific physicochemical properties which confer to their structures certain meta-stability whose modulation permits fulfilling each task of the viral cycle. These natural designed capabilities have impelled using viral capsids as protein containers of artificial cargoes (drugs, polymers, enzymes, minerals) with applications in biomedical and materials sciences. Both natural and artificial protein cages (1) must protect their cargo against a variety of physicochemical aggressive environments, including molecular impacts of highly crowded media, thermal and chemical stresses (2), and osmotic shocks. Viral cages stability depend not only on the ultimate structure of the external capsid, which rely on the interactions between protein subunits, but also on the nature of the cargo. During the last decade our lab has focused on the study of protein cages with Atomic Force Microscopy (AFM). We are interested in stablishing links of their mechanical properties with their structure and function. In particular, mechanics provide information about the cargo storage strategies of both natural and virus-derived protein cages (3,4). AFM has revealed as a nano-surgery tool for inducing genome release (5,6), which happens during infection. The combination of AFM and single molecule fluorescence allows to explore the manipulation of the virus-based nanoreactors function (7).

[1] Llauro et al. *Nanoscale*, 2016, 8, 9328.

[2] Cantero et al. *Cells* 2022, 11, 1759

[3] Ortega-Esteban et al. *ACS Nano*, 2015, 9, 10826, *ACS Nano*, 2015, 9, 10571.

[4] Jiménez-Zaragoza et al. (2018) <https://doi.org/10.7554/eLife.37295.001>

[5] Martín-gonzález et al. *Physical Review X* 2021, 11 (2), 021025.

[6] Martín-gonzález et al. *Sci. Adv.* 9, eade9910 (2023).

[7] Klara Strobl et al. *Small* 2022, 18, 2200059