# Hot electron cooling dynamics in graphene/hBN van der Waals heterostructures

**Jake Dudley Mehew**[1]
Alexander Block,[1] Jaime Díez Mérida,[2] Rafael Luque Merino,[2] Dmitri K. Efetov,[2] and Klaas-Jan Tielrooij[1]
[1] *Catalan Institute of Nanoscience and Nanotechnology (ICN2), CSIC and BIST, 08193 Barcelona, Spain*
[2] *ICFO-Institut de Ciencies Fotoniques, The Barcelona Institute of Science and Technology, 08860 Castelldefels, Barcelona, Spain*
Jake.mehew@icn2.cat

Van der Waals heterostructures allow for the layer by layer design of complex material systems in which new physics and novel device properties can be studied. Electronic and optoelectronic applications will benefit from these enhanced properties providing that the nature of heat flow at the nanoscale is well understood. [1,2,3,4]

In this work, we study hot electron cooling dynamics at pn-junctions electrostatically formed in heterostructures of mono- and bi-layer graphene encapsulated in hexagonal boron nitride (hBN). Using time-resolved photocurrent measurements, we find that the cooling time constant varies from 1-100 ps as we modify the number of graphene layers, Fermi level and lattice temperature.

These results are particularly relevant for applications in thermal management, photodetection and high speed electronics.

## References

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