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Controlling Nanotubes with Phosphorene ALEKSANDR RODIN, ALEXANDRA CARVALHO, ANTONIO HELIO CASTRO NETO, Natl Univ of Singapore — A hundred years after its initial discovery, black phosphorus has become one of the most studied 2D materials. What sets it apart from other members of the 2D family is its highly anisotropic dispersion. While this anisotropy has been studied before in the context of electronic transport, here we investigate its effects from the electro-mechanical standpoint. Dispersion anisotropy results in a direction-dependent polarization which can be utilized to control the arrangements of external charge. Using a combination of analytical and DFT methods, we analyze the interaction of black phosphorus with several different charge configurations. In particular, we address the problem of the orientation of charged carbon nanotubes positioned on top of phosphorene layers.

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