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Quantum emission from hexagonal boron nitride monolayers IGOR AHARONOVICH, TOANTRONG TRAN, KEREM BRAY, MICHAEL J. FORD, MILOS TOTH, University of Technology Sydney, MTEE COLLABORATION — Artificial atomic systems in solids are widely considered the leading physical system for a variety of quantum technologies, including quantum communications, computing and metrology. To date, however, room-temperature quantum emitters have only been observed in wide-bandgap semiconductors such as diamond and silicon carbide, nanocrystal quantum dots, and most recently in carbon nanotubes. Here, we demonstrate room-temperature, polarized single-photon emission from a colour centre in two-dimensional hexagonal boron nitride. The emitters emit at the red and the near infrared spectral range and exhibit narrowband ultra bright emission (˜full width at half maximum of below 10 nm with more than three million counts/s). Density functional theory calculations indicate that vacancy-related defects are a probable source of the emission. Our results demonstrate the unprecedented potential of van der Waals crystals for large-scale nanophotonics and quantum information processing.

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