Tuning THz magnons in a mixed van-der-Waals antiferromagnet

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Magnetic van der Waals (vdW) materials represent an appealing playground for studying magnetism that arises from the interaction of magnetic moments organized in a two-dimensional layer. The ongoing research in this fast expanding field targets not only fundamental issues, mostly related to novel topological and quantum phases of matter, but also test possible ways to use them in various applications, thus giving rise to the fast-expanding area of magnonics. Antiferromagnetically ordered materials often exhibit optically active magnon excitations in the sub-THz and THz spectral range, relevant for future high-speed communication technologies. Here, we experimentally demonstrate the wide and on-demand tuning of magnon energy by altering the composition of an antiferromagnetic van-der-Waals alloy. Through antiferromagnetic resonance measurements on $Fe_{1-x}Ni_xPS_3$ samples with varying x, we observe that magnon energy can be controlled by the mixing ratio x, indicating an effective single-ion magnetic anisotropy. Remarkably, even at high nickel concentrations (up to $x = 0.9$), the alloys retain a perpendicular anisotropy typical of $FePS_3$.