The harmonic metric for hierarchic quasiperiodics ANTONY BOURDILLON, Retired — Sharp diffraction patterns show long range order [1] in i-Al6Mn; translational symmetry is foundby phase contrast, optimum-defocus imagingto be hierarchic. The icosahedral diffraction pattern was novel in two ways: it included five-fold symmetric axes; having moreover diffraction orders in geometric series, imprecisely called Fibonacci. These orders differ from Bragg diffraction which is linear. How does an X-ray sine wave, or electron beam, scatter off the hierarchic structure? Like quantum mechanics, the scattering depends on harmonics: quasi-Bragg angles are derived from quasi-structure factors with a metric that is derived numerically and analytically. All atoms scatter: the metric harmonizes the incident sine wave with hierarchic translational symmetry. The ratio (1.5/tau) 2 produces the harmonic metric, together with geometric series diffraction from a consistent structure [2]. [1] Shechtman, D, et al. (1984) Phys. Rev. Lett. 53, 1951, http://dx.doi.org/10.1103/PhysRevLett.53.1951 [2] Bourdillon, AJ, J. Mod. Phys. 10 [6] 624 (2019), DOI: 10.4263/jmp.2019.106044

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