An Icosahedral Quasicrystal as a golden modification of the icosagrid and its connection to the E8 lattice

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We present an icosahedral quasicrystal as a modification of the icosagrid, a multigrid with 10 plane sets that arranged with icosahedral symmetry. We use the Fibonacci chain to space the planes obtaining a quasicrystal with icosahedral symmetry. It has a surprising correlation to the Elser-Sloane quasicrystal [4], a 4D cut-and-project of the E8 lattice. We call this quasicrystal the Fibonacci modified icosigrid quasicrystal (FMIQ). We found that the FMIQ totally imbeds another quasicrystal that is a compound of 20 3D slices of the Elser-Sloane quasicrystal. The slices, which contains only regular tetrahedra, are put together by a certain ‘golden rotation’ [5]. Interesting 20Gs (20-tetrahedron clusters arranged with the ‘golden rotation’) appear repetitively in the FMIQ and are arranged with icosahedral symmetry. It turns out that this ‘golden rotation’ is the dihedral angle of the 600-cell (the super-cell of the Elser-Sloane quasicrystal) and the angel between the tetrahedral facets in the E8 polytope known as the Gosset polytope. We suggest that the FMIQ is an alternative result of releasing the transdimensional ”geometric frustration” while maintaining the regularity of the tetrahedra.