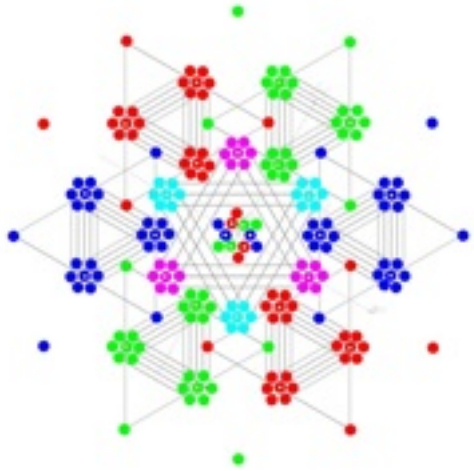
E8 Root Vector Projections - Frank Dodd (Tony) Smith, Jr. - 2008

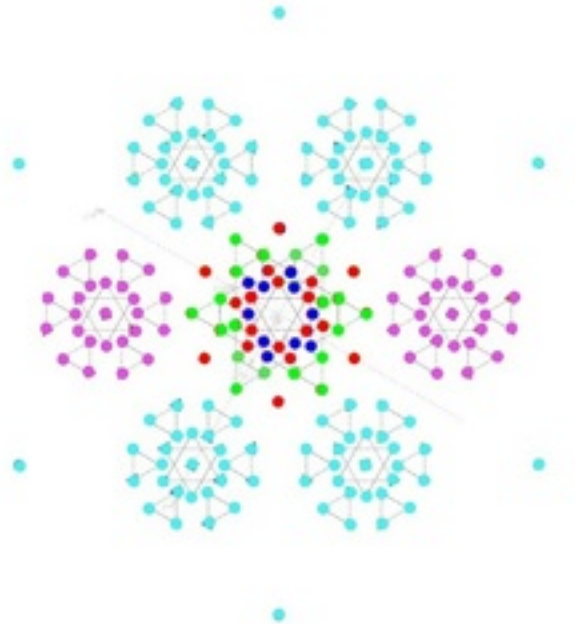
The basis of my E8 physics model, which is based on Garrett Lisi's E8 physics model, is the figure



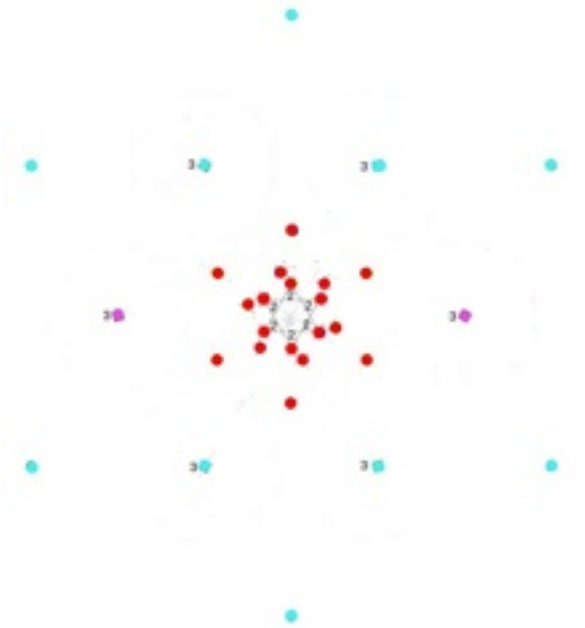
in which the two D4 inside E8 are shown in cyan and magenta.

Another figure I use, based on another projection of E8 root vectors into 2 dimensions, shows a nesting

D4 in D5 in E6 in E7 in E8



in which the two D4 of E8 are (showing multiplicities 3 and 2 of points to which multiple root vectors are projected)



The central red 24 of the inner D4 are obviously contained in E6 in E8.

The outer magenta 6 of the outer D4 in E7 outside E6 are the two central 3 of:

126 root vectors of E7 - 72 root vectors of E6 = 54 = 2x(24+3) =

2 circular 12+12 + 2 central 3

The magenta 6 root vectors of the two central 3 correspond to the root vectors of a 7-sphere S7 (which, although not a Lie algebra due to Octonion non-associativity, is a Malcev algebra)

The magenta 48 = 54-6 of the two E7 circular 12+12 are related to the blue 16 of 8-complex-dimensional Kaluza-Klein vector spacetime D5 outside red D4 so that the magenta 48 and blue 16 combine to form a 48+16 = 64-real-dimensional = 8-octonionic-dimensional vector spacetime .

Therefore, **E7 looks like E6 plus octonification of vector spacetime plus a 7-sphere S7**.

The outer cyan 18 of the outer D4 in E8 outside E7 are the four central 3 plus outside 6 of:

240 root vectors of E8 - 126 root vectors of E7 = 114 = 108 + 6 = 4x(24+3) + 6 =

4 circular 12+12 + 4 central 3 + outside 6

The cyan 12 root vectors of the four central 3 correspond to the root vectors of the 14-dimensional Lie algebra G2.

The outside 6 root vectors correspond to the root vectors of a 7-sphere S7 (which, although not a Lie algebra due to Octonion non-associativity, is a Malcev algebra)

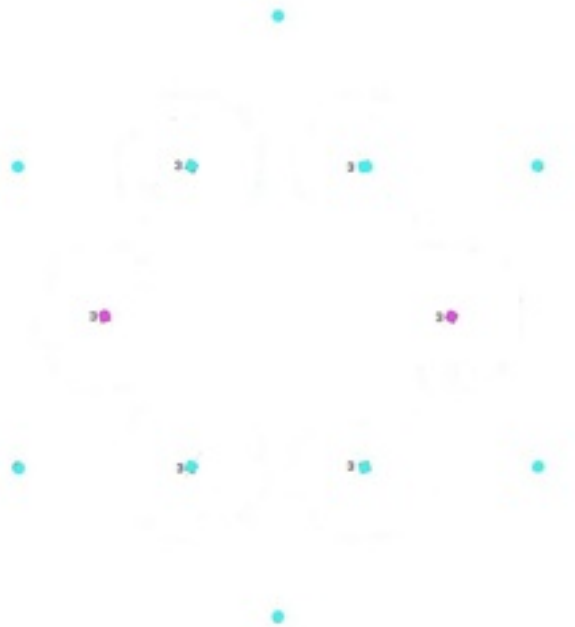
The cyan 96 = 108-12 of the four E8 circular 12+12 are related to the green 32 of 16-complex-dimensional full-spinor E6 fermion first-generation particles and antiparticles so that the cyan 96 and green 32 combine to form 96+32 = 128-real-dimensional = 16-octonionic-dimensional representation space for full-spinor fermion first-generation particles and antiparticles.

Therefore, **E8 looks like E7 plus octonification of representation space for full-spinor fermion first-generation particles and antiparticles plus G2 plus a 7-sphere S7**.

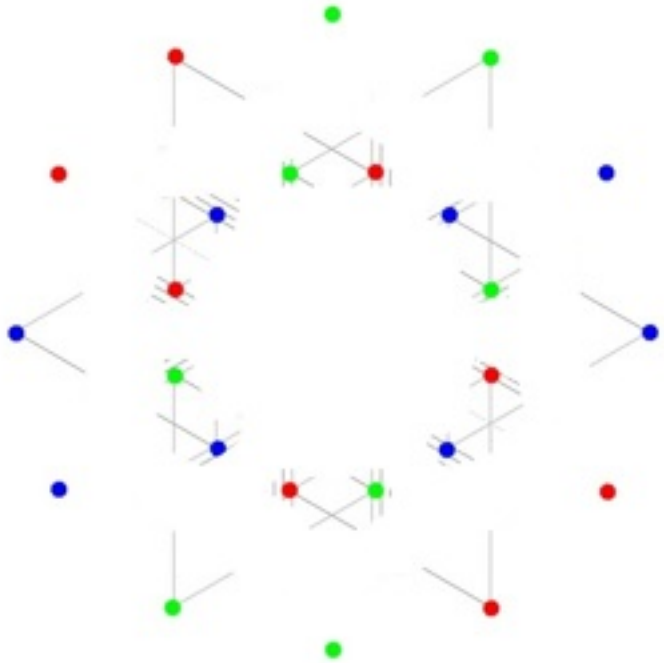
The outer magenta-cyan 24 of the outer D4 of the nesting D4 in D5 in E6 in E7 in E8 is made up of:

7-sphere from E7 plus G2 and 7-sphere from E8

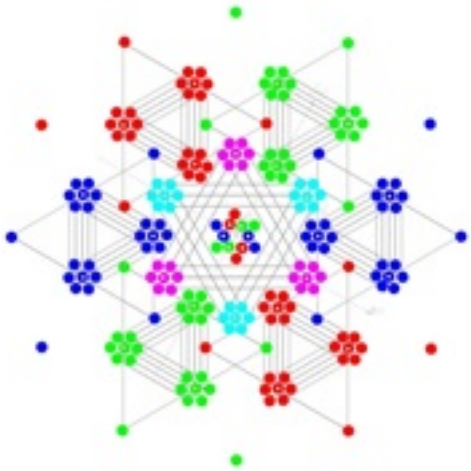
The outer magenta-cyan 24



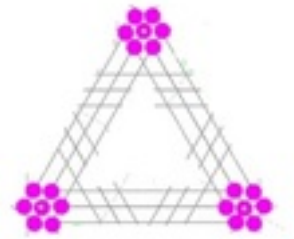
look like the outer red-green-blue 24



in my basic E8 physics model figure



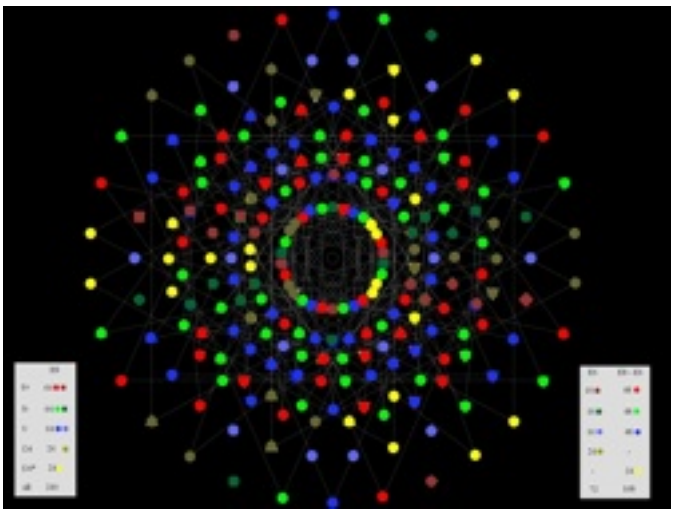
in which the second D4 is represented by its magenta 24



so the physics interpretations of the two projections are related by interchanging, in the basic figure,

its outer red-green-blue 24 and its magenta 24.

The basic figure, so interchanged, and with cyan changed to bright yellow and magenta changed to dark yellow. looks like



from the view of the 240 of E8 as 8 circles of 30.