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Having obtained the coefficients of an icosahedral harmonic expansion, the 3D diffraction volume may be reconstructed as a sum over these icosahedral harmonics. By definition, the resulting diffraction volume will have icosahedral symmetry. If this is constructed at a grid that is oversampled by a factor of 2 in each dimension, we have shown that a “charge flipping” algorithm with no fixed support constraint is able to reconstruct a 3D image of the particle. We find that this procedure not only reconstructs an icosahedral shape for the particle, in simulations for the satellite tobacco necrosis virus (STNV) it even reveals the hollow nature of the protein coat.

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