Sven Möller* (math@moeller-sven.de) and Nils R. Scheithauer. Dimension Formulae and Generalised Deep Holes of the Leech Lattice Vertex Operator Algebra. Preliminary report.

We prove a dimension formula for the weight-one space of a vertex operator algebra $V^{\text{orb}(g)}$ obtained in the orbifold construction associated with a strongly rational, holomorphic vertex operator algebra $V$ of central charge 24 and a cyclic group $\langle g \rangle$ of arbitrary order $n$. Based on a lower bound extracted from this formula we introduce the notion of extremal automorphisms. These automorphisms are in turn central in the definition of what we call generalised deep holes in $\text{Aut}(V)$.

We then give a construction of all 70 strongly rational, holomorphic vertex operator algebras of central charge 24 with non-vanishing weight-one space as orbifold constructions associated with generalised deep holes of the Leech lattice vertex operator algebra $V_\Lambda$. For the first time, this provides a uniform construction of these vertex operator algebras and naturally generalises the construction of the 23 Niemeier lattices with non-vanishing root system from the deep holes of the Leech lattice $\Lambda$ by Conway and Sloane. (Received August 14, 2019)