

1064-17-176

Tevian Dray* (tevian@math.oregonstate.edu), Department of Mathematics, Oregon State University, Corvallis, OR 97331. *A New Look at the Freudenthal-Tits Magic Square*. Preliminary report.

Freudenthal and Tits independently showed how to construct a Lie algebra from a pair of division algebras. The resulting magic square includes all of the exceptional Lie algebras except g_2 , and does so precisely when one (or both) of the division algebras is the octonions.

The goal of this ongoing project is to provide a direct construction of the Lie groups in the magic square, based on Vinberg's symmetric construction of the corresponding Lie algebras. We are most interested in the "half-split" magic square, when one of the division algebras is split, and which includes some real forms of the exceptional Lie groups, such as $E_{6(-26)}$, which are of particular interest to particle physics.

It is well known that E_6 admits a representation in terms of 3×3 octonionic matrices. We first consider a simpler magic square, again of relevance to particle physics, which involves 2×2 matrices over tensor products of division algebras, and find that the corresponding Lie groups can all be represented as " $SU(2, \mathbb{K} \otimes \mathbb{K}')$ ". We then discuss our partial success in interpreting the Freudenthal-Tits magic square as " $SU(3, \mathbb{K} \otimes \mathbb{K}')$ ".

The author thanks John Huerta, Corinne Manogue, and Robert Wilson for discussions. (Received September 07, 2010)