

Title: Welcome and Opening Remarks

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Collection: Octonions and the Standard Model

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# Octonions And The Standard Model

Perimeter Workshop Feb-May 2021

**Introductory Remarks**

**Kirill Krasnov**



**There is a notable recent surge of interest in topics related to the workshop theme**

**Its aim is to bring together people interested in applications of the geometry related to octonions in physics, in particular in the physics of the SM**

**In physics octonions is not a popular subject**

**The battle to use in physics objects more sophisticated than the complex numbers was fought and lost with quaternions more than a century ago**

**At the same time, quaternions and octonions are an established subject within the mathematics community. They do provide the best language to formulate and understand many geometric facts**

**In the retrospect, the fact that quaternions proved to be not so useful for physics is related to the fact that quaternions are about  $SO(4)$  (or  $SO(5,1)$ ) rather than the Lorentz group  $SO(3,1)$**



**But physics is now more sophisticated than it was 100 years ago**

**Physics is now routinely done in higher dimensions. And it is standard to consider Lie groups larger than  $SU(2)$  and  $SU(3)$ , in particular in the context of GUT.**

**It is in the context of dimensions higher than 4 and “large” Lie groups that quaternions and octonions become an indispensable tool**

**In particular, groups related to GUT - e.g.  $SO(10)$  - are most economically described using the octonions. This is the (one of the?) reason(s) why octonions have been observed to be relevant to the description of the elementary particles.**



**This workshop will be a success if it will lead to the recognition that octonions is the relevant and appropriate language for the GUT ideas**

**Success if it will lead to establishing a common language among the practitioners, and prevent people from having to re-discover facts already known**

**Success if it will lead to establishing a community of people interested in the related ideas**

**Enjoy the talks!**

