



FEZA GÜRSEY
CENTER FOR
PHYSICS AND
MATHEMATICS

*Dual
Perspectives
Meetings*

Aspects of Maximally Symmetric Non-Linear (ModMax) Electrodynamics

Dmitri Sorokin

INFN Padova & U. Padova, Dept. of Phys. Astron. "Galileo Galilei"

Abstract: We will review properties and peculiarities of a recently found unique non-linear generalization of Maxwell's electrodynamics (dubbed ModMax) that preserves all the symmetries of the former, i.e. conformal invariance and electric-magnetic duality. In particular, we will see that ModMax admits, as exact solutions, plane waves and Lienard-Wiechert fields induced by a moving electric or magnetic particle, or a dyon; effects of ModMax may manifest themselves in physical phenomena such as vacuum birefringence and in properties of gravitational objects (e.g. charged black holes). ModMax and its Born-Infeld-like generalization arise as TTbar-like deformations of Maxwell's theory and there exist supersymmetric and higher-spin extensions of these models.

First Part:

0) 90 years of non-linear electrodynamics.

1) Introduction to electric-magnetic duality and conformal symmetry in Maxwell's and non-linear electrodynamics. Born-Infeld theory.

2) ModMax and its distinguished features.

3) Exact solutions of the ModMax equations of motion (plane waves and Reissner-Nordstrom black holes).

Second Part:

1) Phenomenon of "vacuum birefringence" in non-linear electrodynamics.

2) What are "TTbar" deformations of field theories and their relation to the Born-Infeld electrodynamics and ModMax?

3) ModMax as an effective theory of EM interactions with an axion-dilaton-like field.

4) Supersymmetric extension and coupling to supergravity.

Date: Friday, October 27, 2023

Program: Morning session 10:30-12:00, Afternoon session 13:30-15:00

Location: Boğaziçi University, Kandilli Campus, Üsküdar-Istanbul