

Declaration of formation of the SAPPHIRES collaboration

We hereby announce our intention to form an experimental collaboration, SAPPHIRES (Search for Axion-like Particles via optical Parametric effects with High Intensity lasers in Empty Space). This collaboration will advance understanding of dark matter and energy in the universe by applying a search scheme based on optical parametric effects in vacuum, through mixing of laser fields having multiple wavelengths. The sensitivity for detecting axion-like dark fields can be improved by increasing laser intensity and pulse repetition rates. Laser intensity will be increased step-by-step through development at laser facilities around the world. The necessary equipment can be universally assembled at any laser facility.

Kensuke Homma, the founder of this approach and the first spokesperson of the SAPPHIRES collaboration, has invented the search method and theoretical interface used to analyze the experimental data collected at Hiroshima University and published the first search result. Shuji Sakabe shares with Homma a profound academic interest in the hidden vacuum structure of the universe. In close collaboration with Sakabe's group at the Institute for Chemical Research (ICR) of Kyoto University, the search system was upgraded for a first-stage experiment with a Ti:sapphire-based chirped pulse amplification (CPA) laser, and we are currently upgrading the search system in preparation for a second-stage experiment with the T⁶-laser at the ICR.

Since this search method is, in principle, extendable to future worldwide high-intensity laser facilities beyond the currently available Ti:Sapphire-based CPA laser at the ICR, we believe that it is worth pursuing this search activity worldwide from a purely academic viewpoint. Therefore, we officially form the SAPPHIRES collaboration in order to efficiently share the experience accumulated among a growing number of collaborators from various institutes at various stages.

The SAPPHIRES collaboration, a purely academic collaboration, will not be restrained by the politics associated with any particular facility, institute, or other organization, even those where actual searches will be performed in the future.

We hereby form the initial SAPPHIRES collaboration on the basis of the above concept.

Kensuke Homma, Hiroshima University,

本間謙輔 2016.9.7

Signature

Date

Shuji Sakabe, Kyoto University,

阪部周二 2016.9.7

Signature

Date