

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Circularly Polarized Light and Growth of Plants PAVEL SHIBAYEV, ROBERT PERGOLIZZI, Bergen Academies, Hackensack, New Jersey — The influence of linearly polarized light on the direction of plants growth has been recently demonstrated. The state of circularly polarized (CP) light can also change when it is reflected from the surface of leaves and stems. However, the role of light handedness in the development of plants and CP light interaction with the complexes of chlorophyll molecules have still not been studied enough. In this work, the role of left CP light in the accelerated growth of lentil and pea plants is revealed and studied. The mechanism of such an enhancement is discussed in terms of the model considering transmission, absorption, and scattering of CP light on micro and macro levels of leaf organization. Theoretical modeling of light interaction with the interior of the leaf was conducted for a number of recently proposed models of organization of chlorophyll molecules and chloroplasts. All the calculations were performed by employing a 4x4 matrix method in solving Maxwell equations. It is shown that left-handed chiral organization of chlorophyll molecules can greatly enhance the absorption of light and therefore lead to the enhanced growth of the whole plant under CP light.

Pavel Shibayev
Bergen Academies

Date submitted: 02 Nov 2010

Electronic form version 1.4