Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

**Reduction of Scattered Light by Müller Cells in the Human Retina** OLIVER BENDIX, RAGNAR FLEISCHMANN, THEO GEISEL, MPI for Dynamics and Self-Organization — It is a long standing question why in the mammalian eye photoreceptors are positioned at the back of the retina, forcing photons to travel through various neuronal layers of the retina before the light-sensitive rods and cones can detect them. Recent studies suggest that certain retinal glial cells–called Müller cells (MCs)–play an important role in answering that question. It has been experimentally shown that MCs extracted from the retina can act as optical fibers [1]. To understand the light guiding properties of the MC in the natural fluctuating optical environment, we developed a model to analyze the light reflection and transmission of MCs embedded in a random medium neuronal tissue. With these quantities and a simplified geometrical eye model we study how light is scattered in the eye. We found that MCs can lead to a substantial increase of the signal-to-noise ratio (SNR), the ratio of the intensity of direct incident light at a photoreceptor to the intensity of back-scattered light from other areas of the retina. The SNR is most pronounced in the vicinity of the fovea and can be more than an order of magnitude.

[1] Franze et. al., Proc Natl Acad Sci USA, 2007, 104, 8287-8292.

Oliver Bendix
MPI for Dynamics and Self-Organization

Date submitted: 07 Dec 2011 Electronic form version 1.4