Photonics
chaired by Rebecca Saive/David Marpaung – room 3

11.45-12.00	*Light and sound interaction in optical waveguides* Roel Botter (LPNO)
12.05-12.20	*Investigation of Solar Cell Output Under Realistic Spectro-Angular Irradiance* Shweta Pal (COPS)
12.25-12.40	*Scanning a focus through scattering media without using the optical memory effect* Bahareh Mastiani (BMPI)
12.45-13.00	*Reactive sputter coating of metal oxides for integrated optics* Ward Hendriks (OS)

Light and sound interaction in optical waveguides, Roel Botter (LPNO)
Stimulated Brillouin scattering (SBS) is a nonlinear optical process based on the interaction of acoustic and optical waves. In this talk, we discuss our efforts towards creating optical waveguides that can guide both acoustic and optical waves with the aim of enhancing SBS. We show how this influences the requirements for the waveguide materials and geometry. Further, we demonstrate how SBS can be used for advanced microwave photonic (MWP) signal processing, and how we want to integrate the SBS functionality on chip with more common MWP processing circuits to create high performance signal processing systems.

Investigation of Solar Cell Output Under Realistic Spectro-Angular Irradiance, Shweta Pal (COPS)
In general, efficiency of a solar cell is determined by measuring the power output under standardized AM1.5 irradiance conditions, which rarely exists in real world. The optical properties of the surroundings, such as ground reflection (albedo), play a crucial role as well. This is particularly important for bifacial modules as they accept light from both faces, front & rear. It has been shown that the spectral dependence of the albedo further influences the output significantly. Thus, to fully know the yield it is important to have accurate knowledge of the 360^o angle & wavelength resolved irradiance, hereby referred to as spectro-angular irradiance.

Here, we present a novel setup & procedure to record spectro-angular irradiance using a fiber-coupled spectrometer. PV cell output is determined by combining the spectro-angular irradiance measurements with computationally simulated external quantum efficiencies of the cells. We have computationally investigated the performance of solar cells under measured spectro-angular solar irradiance at different locations & different times throughout the year. Such data can help in comparing cell performances & determining the optimal module configuration & albedo for any given location under various weather conditions.

Scanning a focus through scattering media without using the optical memory effect, Bahareh Mastiani (BMPI)

Wavefront shaping makes it possible to form a focus through opaque scattering materials. In some cases, this focus may be scanned over a small distance using the optical memory effect. However, in many cases of interest, the optical memory effect has a limited range or is even too small to be measured. In such cases, one often resorts to measuring the full transmission matrix (TM) of the sample to completely control the light transmission. However, this process is time-consuming and may not always be possible. We introduce a new method for focusing and scanning the focus at any arbitrary position behind the medium by measuring only a subset of the transmission matrix, called Sparse Field Focusing (SFF). With SFF, the scan range is not limited to the memory effect and there is no need to measure the full transmission matrix. Our experimental results agree well with our theoretical model. We expect this method will find applications in imaging through scattering media, especially when the optical memory effect range is small.

Reactive sputter coating of metal oxides for integrated optics, Ward Hendriks (OS)

Metal oxides are interesting materials for integrated optical circuits as the possibility to be doped by rare earth metals allows for a combination of active and passive components in one circuit. Obtaining low loss optically guiding layers with and without rare earth doping is however nontrivial. Using a reactive sputter process, low loss optically guiding layers have been achieved. We will show the parameters of interest to this process and how to tune them to reproducibly obtain optically guiding layers. In addition, the grown layers will be analyzed to explain why low loss optical guiding is obtained under certain conditions and not for others, concluding with the obtained devices and results in the studied materials.