“This project has received funding from the European Union’s Horizon 2020 research and innovation programme for the period January 2019 until December 2022 under Grant Agreement No 824135 (SOLARNET)”

WP8 - SPRING 2019 Workshop
SOLARNET - High Resolution Solar Physics Network
Freiburg
April 29 -30, 2019

Venue: Leibniz-Institut für Sonnenphysik (KIS)
Schöneckstraße 6
79104 Freiburg, Germany

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Agenda

Monday, April 29, 2019		
09:00	Markus Roth	Welcome & Overview on WP8: SPRING
	Design of telescopes and instrument platform	
09:30	Sanjay Gosain & Dirk Soltau	Review of SPRING telescope concepts
10:00	Alfred de Wijn	GBSON concept
10:30	***Coffee break***	
11:00	Michal Sobotka	Synoptic observations in Ondrejov and the cloud detection
11:30	Discussion	
12:30	***Catered Lunch***	
	Post-focus instrumentation	
14:00	Dirk Soltau	SPRING and HELLRIDE - cont'd - Status and activities at KIS
14:30	Ilaria Ermolli	Instrumentation and data that will be available to the project
15:00	Alfred de Wijn	Coronographs and ChroMag
15:30	***Coffee break***	
16:00	Daniele Calchetti	MOF-based synoptic telescopes for LoS velocity and magnetic fields at different heights in the Sun's atmosphere
16:30	Discussion	
17:30	Adjourn	
19:15	***Dinner***	Kartoffelhaus Freiburg Basler Str. 10, 79100 Freiburg im Breisgau
Tuesday, April 30, 2019		
	Data Recording and Processing	
09:00	Robbe Vansintjan	Plans for Lucky Imaging
09:30	Sabrina Bechet	Data Homogenization
09:50	Astrid Veronig	Automatic Flare Detection at Kanzelhöhe Observatory
10:10	Werner Pötzi	Limb-darkening and flat-field correction
10:30	***Coffee Break***	
11:00	Robert Jarolim	Deep Learning for Multi-Site Solar Observations: from Quality Estimation to Image Reconstruction
11:30	Luis Bellot Rubio	Plans for the Development of the Stokes Inversion Algorithms
12:00	Discussion	
12:30	***Catered Lunch***	
14:00	***Workshop End***	

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Abstracts

Speaker	Abstracts of the Talks
Astrid Veronig	In the framework of the ESA's SSA program, an automatic flare detection system based on real-time Halpha full-disk filtergrams was developed at Kanzelhöhe Observatory (KSO). The system has been in operation since mid-2013, and the detection algorithm was upgraded in September 2017. in this talk, we give a brief overview of the system, its performance, and on the plans to extend toward data from multi-stations within the Solarnet-2 activities.
Daniele Calchetti	The Magneto Optical Filters at Two Heights (MOTH) experiment consists of two Doppler-magnetographs that each measure the Line-of-Sight (LoS) Doppler velocity and magnetic fields over the full solar disk at a given (different) height in the Sun's atmosphere. The MOTH uses magneto-optical filters (MOFs) at 589 nm (Na D2-line) and 770 nm (K D1-line) and looks at the photosphere low chromosphere region of the Sun's atmosphere (between 400 km and 700 km). The Tor Vergata Solar Synoptic Telescope (TSST) project started in 2011 in collaboration with people involved in MOTH experiment (IfA-University of Hawaii, Georgia State University and JPL) and uses a double telescope for full disk solar images, a MOF-based telescope operating at 770 nm (K D1-line) and a HÎ± Daystar SR-127 0.4A telescope. Real-time information about HÎ± structures and LoS velocity and magnetic maps at different solar layers will be the output of a MOF-based network of telescopes (MOTH, VAMOS, TSST and similar MOF-based instruments) to investigate and automatically detect flare location and associated velocity and magnetic features, an essential input to space weather prediction.
Dirk Soltau	SPRING and HELLRIDE – cont'd - Status and activities at KIS *Dirk Soltau, Sanjay Gosain, Markus Roth* In this presentation we summarize the instrumental considerations that came out of the instrument concept which was proposed at the end of the former SOLARNET program in 2017. We introduce the activities which started at KIS und present a coarse plan for the next future.
Michal Sobotka	In the first part, an overview of solar full-disc observations made at the Ondřejov Observatory is presented. These observations may serve as test data sets for the SPRING data calibration and merging. In the second part, a method of cloud detection in full-disc solar images is outlined. This method is used for a classification of an effect of cloud shadows on the usability of full-disc images.
Robert Jarolim	In recent years deep learning had a major impact in various disciplines. New state-of-the-art results have been achieved in image processing, voice recognition, decision making and many other domains. Deep learning has proven to be robust and capable of solving complex tasks. In contrast to other algorithms deep learning benefits from large amounts of data and the inference times are typically short. Under these aspects deep learning is also of interest for tasks within the SOLARNET H2020 project. We will discuss the potential benefits and applications of deep learning for SPRING. Adequate data filtering and merging of simultaneous observations from multiple observation sites need suitable measure for single-site image quality. Recent approaches with neural networks have proven to perform well on image quality

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	assessment. For full-disk solar observations additional effects, like local atmospheric and seeing conditions, complicate the situation. We propose a customized neural network, to account for the image quality assessment. As a baseline we use the currently operating quality estimation of the Kanzelhöhe Observatory for Solar and Environmental Research (KSO), which is based on a combination of parameters that describe local and global properties extracted from each recorded image. The dataset will consist of manually annotated H-alpha images between 2008 and 2019, covering a wide range of solar activity conditions. The advantage of this approach is that additional observation sites can be included with reduced effort by reusing the pre-trained neural network. Additionally, we are investigating reconstruction and homogenization methods to compensate for local seeing conditions. This can be accomplished by a neural network which translates between high- and low-quality images. The architecture is based on generative adversarial networks (GANs). We use high quality images as conditional input for generating a neural network to create realistic low-quality solar images. In parallel a second generator is trained to reproduce the original image. With this approach a dataset of paired ground-truth and degraded images is created. This will be of further use for artificial scenarios of multi-site observation with mixed qualities and for performance estimation of the reconstruction algorithms. To enforce the generation of artificial low-quality images a discriminating network is used to identify the differences between low- and high-quality images. With further training on the full augmented dataset, this network serves as an image quality classifier.
Werner Pötzi	At the Kanzelhöhe Observatory various methods have been in use over the last decades to correct the flat-field or the center-to-limb variation in order to get a flat solar image. These flattening is important for automatic feature detection algorithms to extent the detection of features like flares or filaments towards the solar limb. I just want to show some examples that were in use at our Observatory in order to start some discussion about this problem.

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