Summary:
The Sun, the stars, and total eclipses

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Abstract. This diverse group of scientists has traveled from around the globe on the event of a total solar eclipse over Szombathely, Hungary to experience a most bedazzling spectacle. With this gathering we take the opportunity to examine new results in solar physics and in the physics of Sun-like stars. In this summary I will highlight pervasive themes and connections which emerged in the talks and posters presented.

This meeting is being held on the occasion of a total solar eclipse - a relatively rare and beautiful event, and one for which a gathering to try and understand aspects of solar physics is appropriate. Still, the Sun is a star, very similar to numerous other stars we can observe, albeit as point sources only. It is constructive for solar physicists to remember the Sun's place in the rest of the Universe, and for stellar astronomers to take advantage of knowledge gained by studying one particular star whose surface can be resolved. Of course any gathering of researchers from such diverse backgrounds quickly becomes instructional in a more mundane way ("Gould Belt"? "Prominence Barbs"?), as we are all forced to define (and defend!) our jargon across both disciplines and languages.

Highlights of the talks and posters (in the humble opinion of this solar astronomer) begin with observations of stellar (hence solar) formation. Of specific interest is the transition which takes place during the evolution from proto-stellar to main-sequence states.

Activity, as manifest by variations in radiative output on both short and long timescales, characterizes the Sun and other stars of similar size/age to our Sun. Such variations are manifest in all wavelengths from variations in X-ray coronal emission, to optical photospheric/chromospheric signatures of sun/star spots and plage, to radio signals from solar storms (see van Driel, p95). The signatures of activity as measured in these varied wavelengths is a common thread in solar and stellar physics, the Sun providing a close-up view of the emission sources, (see Nitta, p117; Schmieder, p57; Knaack *et al.*, p45) and the stellar neighbors providing variety and extreme examples for comparison with the solar case.

Magnetic fields are the most profound common thread. Magnetic fields act like "flies on a pole" to transfer angular momentum in tidally locked binary systems (see Maceroni *et al.*, p15), and during stellar formation. Yet closer to the stellar surface we now know that fields which have been twisted so as to carry excess energy provide the likely source of solar energetic phenomena such as flares and coronal mass ejections (see van Driel-Gesztelyi, p95). By extension and Occam's razor, we infer that this process is the basis for similar events observed in solar analogue stars.

Again, the Sun is our fiducial, due to the fact that we can resolve spatial detail from its photosphere up through its corona. We can discern the emission processes at different temperatures and wavelengths, and from these observations determine power-laws or other scaling rules which then serve as proxies for interpreting the observations of unresolvable objects (see Matthews *et al.*, p53; Oláh, p25). We know from solar observations that magnetic fields are manifest on the Sun's photosphere at the smallest scales and the largest spotted active regions. Hence, the photometric changes brought on by large magnetic flux concentrations are key diagnostics to placing the Sun amongst active stars, and *vice versa* (see Oláh, p25; Knaack *et al.*, p45).

Both modeling efforts and observational capabilities have advanced now to where solar and stellar astronomers can compare notes most easily. Modelers and observers can now challenge each other with predictions and counter-examples. We have seen this here in the presentations by Antiochos, Schmieder, Démoulin, Leka, and Knaack.

As for this meeting, the talks and posters have sparked questions over toasts of Tockaj and discussions over delicious bowls of goulash. No doubt at least a few pieces of future research will be guided and pushed by the presentations we have heard and seen.

But to the eclipse! For millennia, humans have observed the sun and gazed at the stars partly because of their intrinsic beauty. The total solar eclipses visible on the Earth violate the principle universality to some degree, for it is a rare coincidence that our Moon and Sun are so close in size and have the exact orbital elements so as to produce the Diamond Ring, the visible prominences, and the spectacular vision of the corona. From the earliest observations of eclipses, solar physics was in part born - the naming of the chromosphere, the first observations of coronal mass ejections. Let us tomorrow stand in awe and appreciation of the universe around us as we watch and wonder at the last total solar eclipse of this century.

[And it was indeed spectacular, despite a thin cloud cover. Afterwards the wine and food flowed and plans began for the next total eclipse in 2001. Not a soul was disappointed, and most were completely spellbound. A fitting close to a very memorable meeting.]