DISCUSSION

A part of the discussion was devoted to further clarification of some instrumental and observational aspects. It became clear that the assumption of the existence of strongly concentrated fields in the photosphere does not remove entirely the difficulties of interpreting magnetograph signals. According to Semel it appears at present impossible to derive consistent models of this magnetic field when taking a large number of spectral lines measured simultaneously into account. It was also debated by Severny and Wiehr, whether the calibration curves used in the line ratio procedure should be derived from measured or rather from computed line profiles.

The question for the minimum observed size of magnetic structures raised by Newkirk remained unanswered. Recent attempts to derive this quantity directly by observation yielded no information beyond the 1" limit. Spectra taken in the 6302.5 line at the Sac Peak vacuum tower by Koutchmy show some magnetic features in the 1 kgauss range definitely larger than the filigree structures observed simultaneously near the photosphere. The Crimean observers plainly question the existence of any magnetic structures in the photosphere smaller than 1.5" on the grounds of measurements obtained during a transit of Mercury, which was used as an occulting disc; these observations failed to show any sudden jumps in the field strength averaged across the $(1")^2$ aperture. They also find that the short magnetic diffusion time ($\sim 10^3$ s) is at variance with the existence of structures of the order of 100 km diameter (Severny).

The difficulties encountered in deriving facular models, consistent with the center to limb variation of the facular contrast in various lines as well as in the continuum was pointed out by Wiehr.

Finally the question of velocity fields associated with the small scale flux concentrations was discussed again. Downward velocities measured in the chromosphere

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are typically 0.5 km s^{-1} accelerating to $\sim$2 km s^{-1} in photospheric metallic lines. It is unlikely that the peak velocity of the downdrafts occurs within the flux tube because this would immediately evacuate the chromospheric structure extending above the flux element. A motion picture shown by Giovanelli, based on a series of circular polarisation filtergrams taken in the CaI 6103 line clearly demonstrated average downward motions in the polarized structures as well as superimposed vertical oscillations with a period of $\sim$5 min.

In discussing the role of convection for the generation and confinement of the magnetic field, Frisch stressed the importance of intermittency effects in turbulence, while Souffrin pointed out that we should expect a hierarchy of sizes for the magnetic structures.

Syrovatsky remarked that the Boussinesq approximation is not useful in the case of strong magnetic fields, and drew the attention to the importance of acoustic MHD waves.

Several models to explain the small-scale structure of the fluxtubes were proposed:
Lynch has used an approach developed by Dicke to derive a grid of fluxtube models corresponding to various positive (faculae, network) or negative (sunspots) brightness contrasts in the continuum. The models will be used later for more detailed fits with recent observations.

Wilson considered twisted and untwisted magnetostatic fluxtubes. In the isothermal case the untwisted tube is unstable to the exchange instability and may split up into smaller tubes. However, when the temperature and granulation features are taken into account the fragmentation does not continue indefinitely, but the total energy is minimized for a flux tube of finite size. With sufficient cooling the overall energy can be minimized in a single structure rather than in a subdivided configuration.

Nordlund proposed a mechanism, which explains the cooling inside the fluxtube as a result of the almost adiabatic motion of the downdrafts. In his model, a net negative buoyancy along the field lines is produced, which sustains the downdrafts.