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**ANALYSIS OF THE QUALITY OF THE AUTORADIO-
GRAPHIC IMAGE ON SOLID STATE NUCLEAR
TRACK DETECTORS**

ABSTRACT - A simple image formation model of autoradiography with solid state nuclear track detectors was established. It enabled the image unsharpness, the contrast, the detail discernment, the sensitivity and the signal-to-noise ratio to be investigated.

The spread of the optical density function of line, plane and half space sources were calculated. Results were used to clarify the effects of particle range, critical angle of etching and track size on the unsharpness and the relative contrast. A comparison between the calculated and experimentally determined edge spread functions is presented. The agreement was very satisfactory for different thicknesses of the KODAK LR 115 detector used in the experiment. Parametric studies of the contribution of particular variables to the image unsharpness were made. The validity and limitations of empirical unsharpness formula used are discussed.

The influence of statistical fluctuation on image formation was also studied in some detail. Effects of the main autoradiographic parameters (exposure, response of the detector for charged particles, concentration of the elements emitting charged particles, track size and image unsharpness) on the sensitivity, the detail discernment and the signal-to-noise ratio were investigated.