ESRF	**Experiment title:** **Investigation by phase contrast radiography of some patological human tissues**	**Experiment number**: LS-879
Beamline: BM 05	**Date of experiment**: from: 08/07/1998 to: 10/07/1998	**Date of report**: 10/09/1998
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Report:

Hard X-rays phase-contrast radiography is an emergent technique for the observation of internal structures of various objects. Unlike absorption contrast radiography which has been widely used since the discovery of X-rays in many fields and in which the image formation arise from differential absorption along the X-ray path due to variations in composition and thickness of the object, phase contrast imaging is based on a refraction phenomena taking place on any boundary separating media with different refraction coefficients [1]. In particular, phase contrast imaging offers a big improvement in contrast sensitivity especially when imaging weakly absorbing objects [2].

The experiment we performed was divided into two sessions.The selected energy was 8keV in both cases. In the first session we applied the free propagation technique in which no optical element, apart the monochromator, was used. In this case we exploited the coherence of synchrotron radiation. In particular, we put the film dectector 1 m away from the sample to obtain various phase contrast images.

In the second session we used the double crystal setup. In this case two Si (111) crystals were used and the sample placed beetwen them. The crystal upwards the sample, working in Bragg's geometry, monochromated and redirected the radiation in the sample direction. The crystal downwards the sample, called analyser, reflected to the film only those rays deviated from the sample of an angle lower than the Darwin width. In this way the contours of objects were evidenced because in the boundary zones the grazing angle is lower and the deviation greater.

References

[1] T. J. Davis, D. Gao, T.E. Gureyev, A.W. Stevenson, S.W. Wilkins, Nature 373, 595 (1995)

[2] S. W. Wilkins, T. E. Gureyev, D.Gao, A. Pogany, A. W. Stevenson, Nature 384, 335 (1996)