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	SPIRE/HIFI Focal Plane Sharing – SPIRE Proposal B. Swinyard	

At the commonality meeting in April 1999 the HIFI team presented their latest designs and asked the SPIRE team to evaluate whether the space they required in the focal plane was compatible with the opto-mechanical layout of SPIRE. The SPIRE team has now had several iterations of the opto-mechanical layout of the instrument and has an optical design that is compatible with the space envelope – especially the headroom – available in the FIRST cryostat.

The major problem faced by the SPIRE optical/mechanical design team was to fit the photometer and spectrometer in to the headroom available in the FIRST cryostat whilst maintaining good image quality. This has been achieved at the expense of making the SPIRE tertiary mirror (M3) somewhat larger than in earlier designs. Figure 1 shows a schematic of the largest mirrors in the SPIRE optical train. The edge of M3 is now some 82 mm on the –Y (HIFI) side of the optical axis of the telescope. The extension onto this side is to allow the field of view for the spectrometer through when the beam steering mirror is at its central position. This means that if the beam steering mirror mechanism were to fail there would be no catastrophic loss of one or other instrument channels.

It can be seen from figure 1 that the size of M3 means that our design is not compatible with HIFI's current mechanical design. In order to allow structure; covers and rattle space between the two instruments the SPIRE team feels it needs at least 50 mm between the edge of M3 and the wall of the HIFI instrument. This means that the HIFI instrument can be no less than 132 mm from the optical axis in this region of the focal plane. This is not driven by the need to put down support struts as these can be accommodated underneath the current HIFI structure, but is fundamental the optical design of SPIRE – we would require a radical design change to do anything very different. This in turn would inevitably lead to a loss in scientific performance.

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