Technical Case

This document will make the case for observing B0218+357 at 95 GHz.

As already mentioned in the scientific justification, the system is bright, with a measured flux density with the Plateau de Bure interferometer of about 0.5 Jy at 90 GHz (Jethava et al., 2007). With a flux density of close to 4:1, the weaker of the images should be at least 100 mJy. According to the ALMA Sensitivity Calculator, a sensitivity of 0.1 mJy is achievable in less then one minute. This will produce a signal to noise of 1000:1 on the weaker of the two images in total flux and 100:1 in polarised flux (both images are 10 per cent polarised). This will give excellent measurements of the flux densities of each image which we will, in line with our previous work, measure using model fitting to the (u, v) visibilities.

The best results should come from measuring the polarised flux density of each image and thus the measurements will need to be calibrated in polarisation. An excellent calibrator for this is 3C 84 which lies about 20 degrees from 0218+357 and has been used for our previous VLA monitoring observations. It is unpolarised and thus can be used to determine the polarisation calibration with only a single observation. Trippe et al. (2010) have recently verified that this source remains unpolarised at submm frequencies with the Plateau de Bure Interferometer. It is also bright ($\sim$8 Jy) and should require little observing time to achieve acceptable polarisation calibration. We will observe a phase calibrator either side of the 0218+357 observation, but will subsequently self-calibrate the target data.

Crucial to the success of these observations will be the ability to separate the two lensed cores which lie only 334 mas apart. At 95 GHz this will require baselines that are at least 3 km long. As we expect that ALMA will spend about half a year in its extended configurations then the requested three months of observations should be possible.

References

Jethava N., Henkel C., Menten K. M., Carilli C. L., Reid M. J., 2007, A&A, 472, 435

Trippe S., Neri R., Krips M., Castro-Carrizo A., Bremer M., Pietu V., Fontana A. L., 2010, ArXiv e-prints