Test Star Photometry

Excel spreadsheet

		A	B	C	D
sky		**40**	40	40	**40**
amplitude		**40**	20	14.4	**10**
PSF	r0	**9.0**			**18.0**
PSF	**FWHM**	**15**	21.213	25	**30**
S/N	optimal	**56.0**	41.9	38.6	**33.1**
S/N	optimal (poor sampling)	**52.1**	38.5	35.3	**30.2**
S/N	aperture (best)	**53.4**	40.3	37.5	**32.4**
total flux		**10208**	10203	10202	**10208**

synthetic images and LYMM software

		A	B	C	D
sky		**4000**			**4000**
amplitude		**3987.8**			**1000**
PSF	FWHM	**1.5**			**3.0**
S/N	optimal	**52.5**			**32.3**
S/N	aperture 1.5	**49.2**			**29.7**
S/N	aperture 2.0	**43.0**			**31.1**
S/N	aperture 3.0	**30.1**			**28.0**

Synthetic images and LYMM software

Identical stars were placed at different positions with respect to pixel grid –
this allows us to investigate errors caused by poor sampling, in which the flux
varies across individual pixels. Pixel sensitivity is assumed to be uniform.

Test stars:

star	x	y
a	100	100
b	130.24	130.24
c	160.54	160.46
d	190.54	190
e	130.23	160

Table below shows computed S/N, and – in the last column – dispersion
caused by intra-pixel flux variations. I also show some examples in which the
extraction PSF does not match the true stellar PSF.

Test	aperture radius	PSF star	PSF extraction	extracted flux	S/N	**total spread** extracted flux permil
1	optimal	0.9	0.91	10207	52.43	1.4
1	1.5	0.9		8866	49.73	25.4
1	2.0	0.9		9900	42.77	5.5
1	3.0	0.9		10155	29.83	0.3
1	optimal	0.9	0.71	8486	51.80	65.6
1	optimal	0.9	1.11	11705	51.89	4.2
2	optimal	1.8		10211	32.32	4.9
2	1.5	1.8		4893	29.44	42.3
2	2.0	1.8		6967	31.14	27.0
2	3.0	1.8		9417	27.81	10.8
2	optimal	1.8	1.41	7985	31.63	5.0
2	optimal	1.8	1.51	8574	31.96	5.0
2	optimal	1.8	2.21	12046	31.80	4.7

1 permil = 0.1 percent