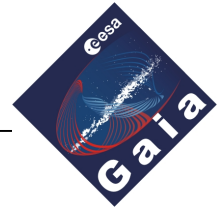


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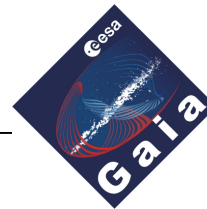
Paris 28 September 2006

Gaia RVS Optimization



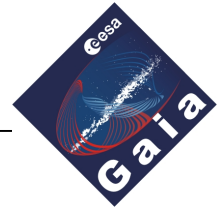
Content

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- 2. High Resolution / Low Resolution Modes**
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- 4. Requirements**
- 5. RVS Related Milestones**



Telescope Optimization

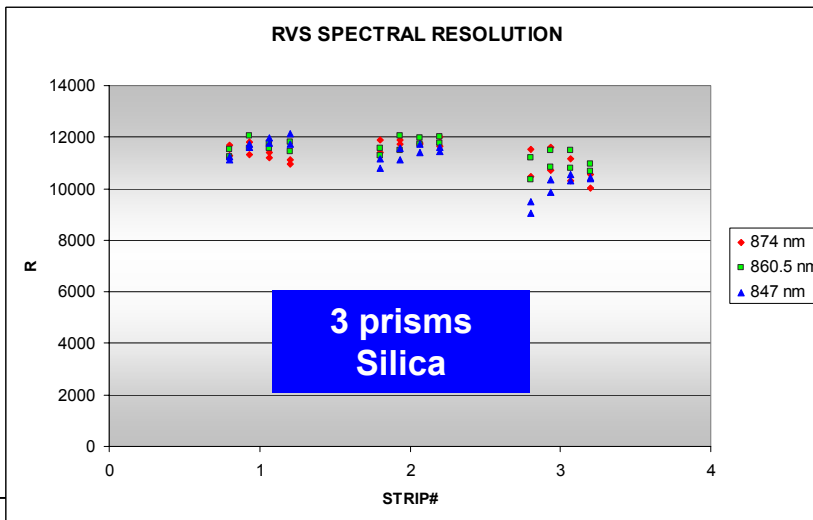
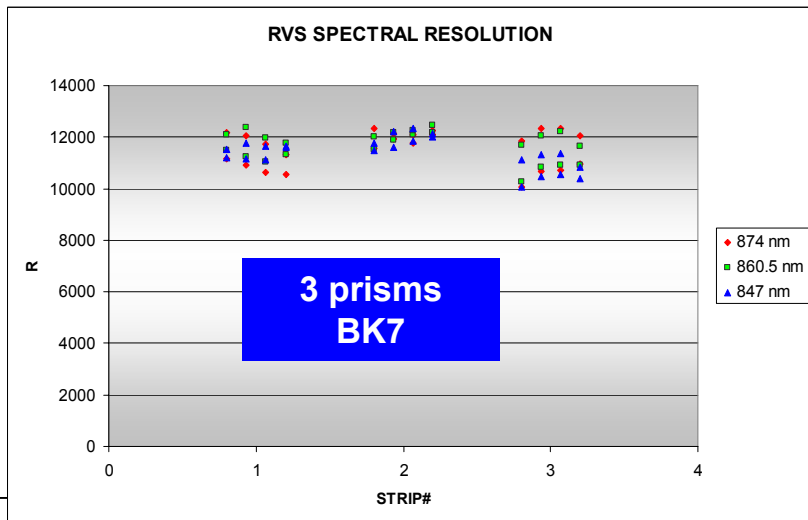
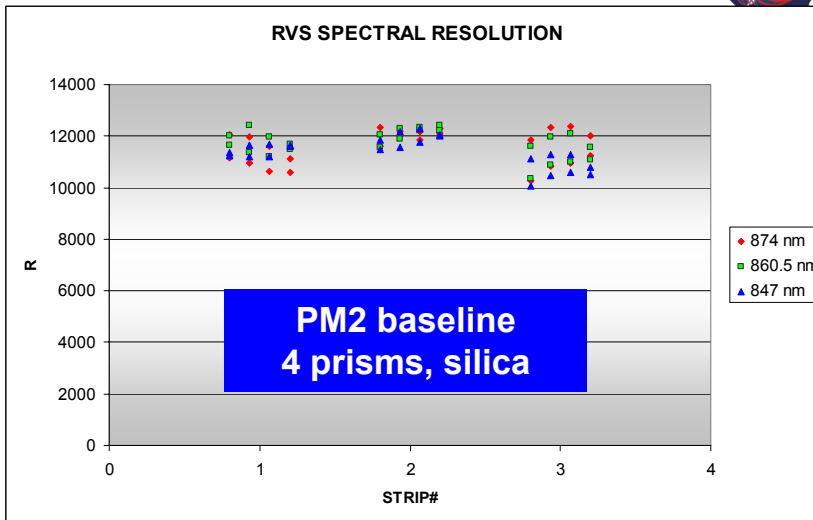
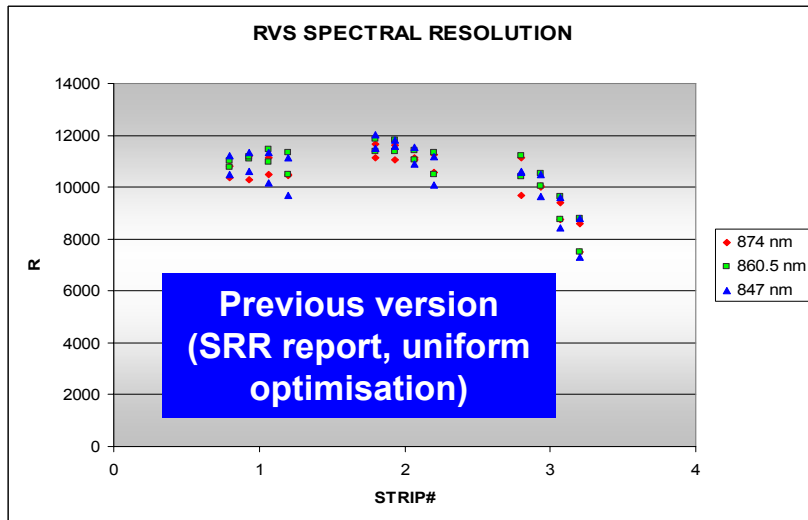
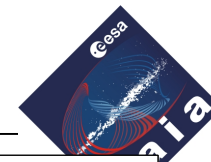
ESA AWG, Gaia RVS Optimization



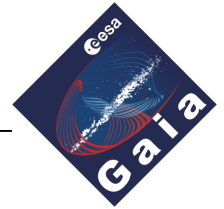
- ❑ Four new versions of RVS optimised / characterised with the new telescope design
- ❑ Resolution performance is evaluated using global LSF AL at 76% energy
- ❑ Calculated for transits at CCD centres, for the 12 CCDs, 3 wavelengths (central and extremes) and the two telescopes (total: 72 points)

Version	R average	R std dev.	R min	#pts with R < 10000	Remarks
Oct 2005	8840	1580	5900	56	Chromatic effect predominant
Baseline SRR (4P)	10450	1420	6600	22	1 point (R = 9800) outside strip 3
SRR variant with uniform weighting	10530	1070	6600	17	
Baseline PM2 (4P silica)	11570	600	10080	0	
3P silica	11250	640	9060	3	R < 10000 for blue wavelength only
3P BK7	11550	620	10050	0	
4P silica, 6x2 CCDs	11480	670	9260	3	Without reoptimisation (R < 10000 for one CCD of one TEL)

ESA AWG, Gaia RVS Optimization



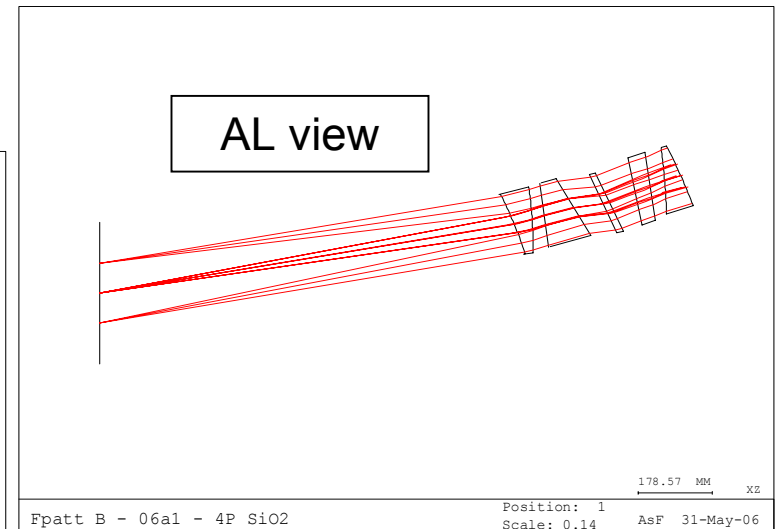
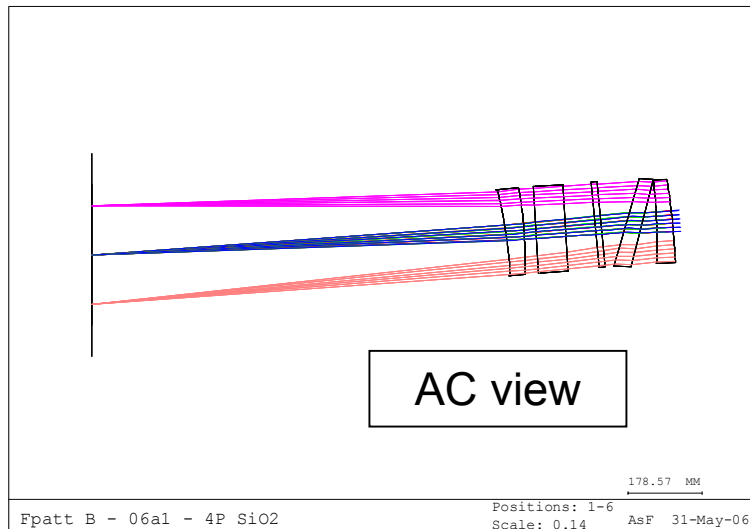
ESA AWG, Gaia RVS Optimization

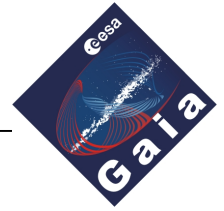


□ The 4 X 3 CCDs, 4 prisms in silica is the selected baseline

□ Optical layout for the preferred version:

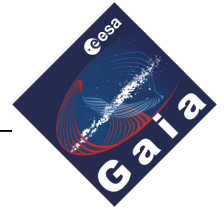
- 2 prismatic lenses (spherical surfaces) + 2 prisms + Grating plate design
- All-silica design
- At 1.4 m from FPA
- 4x3 CCDs configuration
- AC shift of the RVS field of view





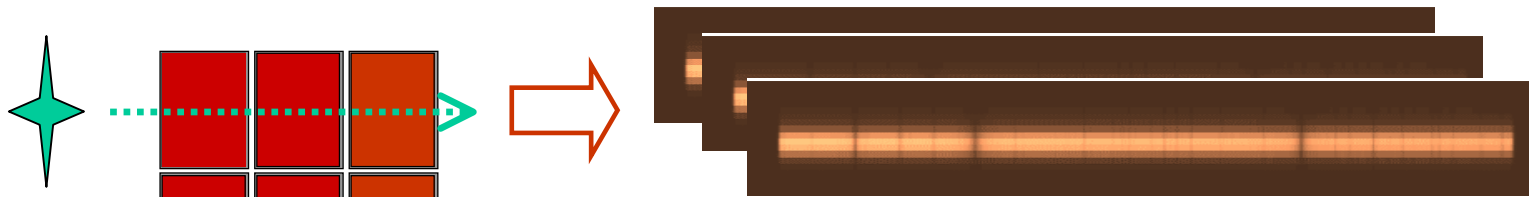
High Resolution / Low Resolution Modes

ESA AWG, Gaia RVS Optimization



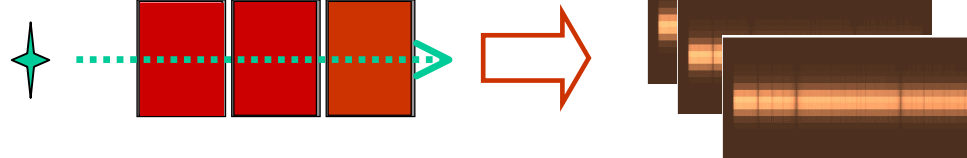
- Threshold has to be defined for HR acquisition for bright stars

Bright star acquisition scheme



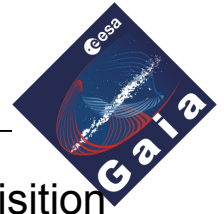
3 high resolution (HR) spectra (1035 pixels)

Faint star acquisition scheme

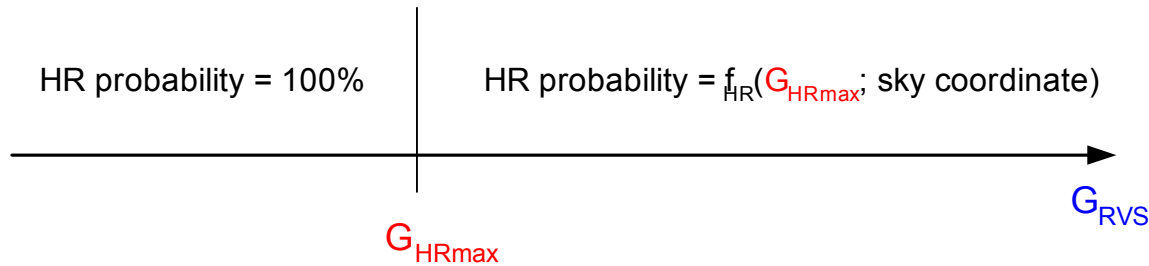


3 low resolution (LR) spectrum (345 pixels)

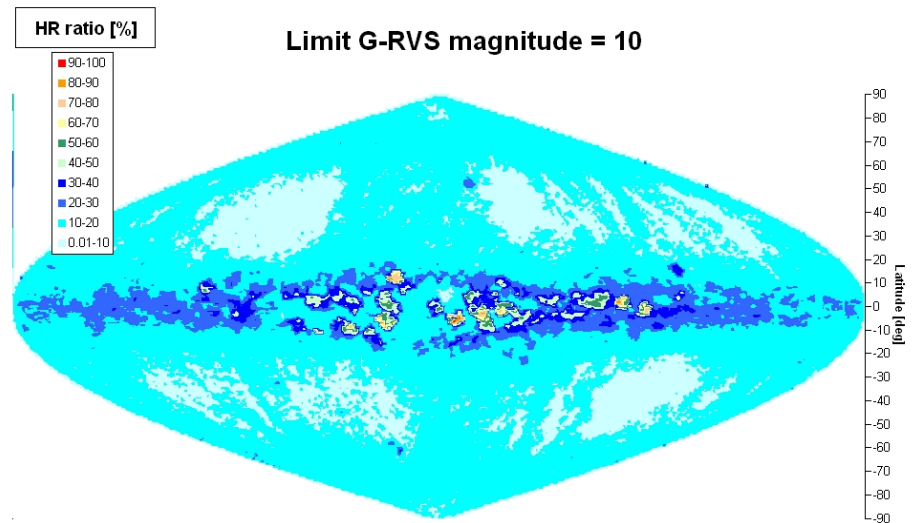
ESA AWG, Gaia RVS Optimization

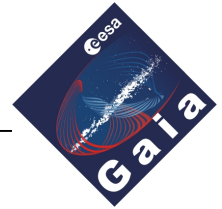


□ The selected strategy is a simple magnitude threshold with priority to HR acquisition mode for stars brighter than this threshold:



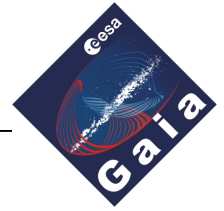
□ It generates an end-of-mission proportion of spectra acquired in HR mode for faint stars (HR “ratio” or “probability”) dependent on the galactic coordinate of the star:





RVS Performances

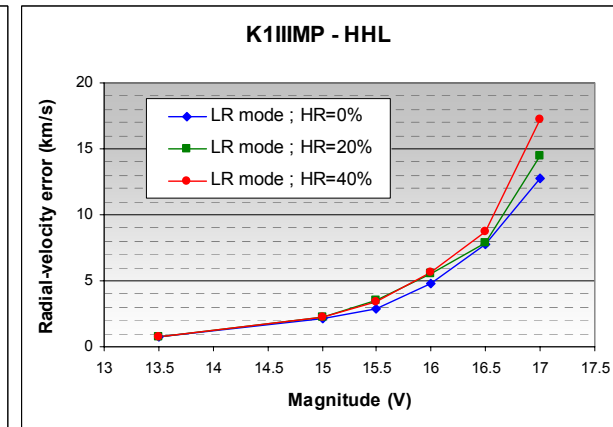
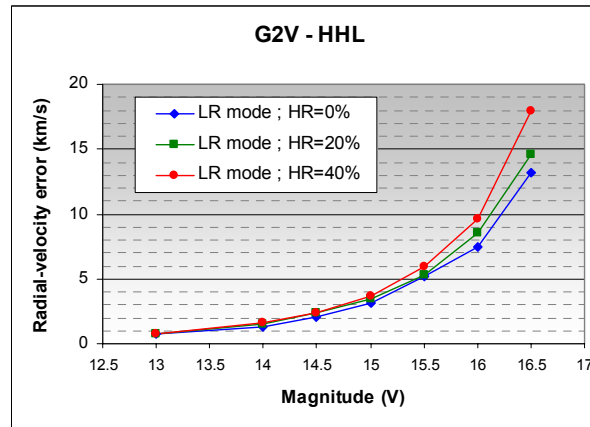
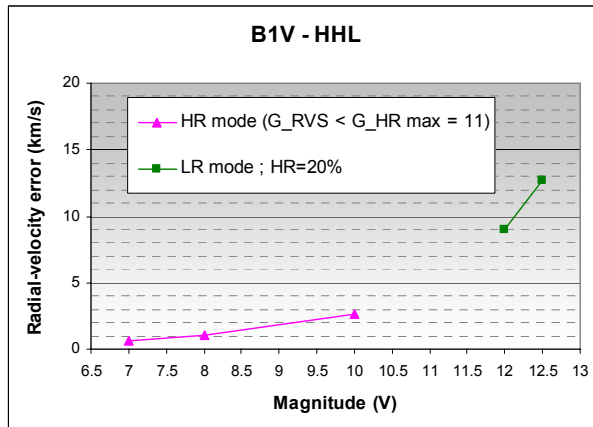
ESA AWG, Gaia RVS Optimization



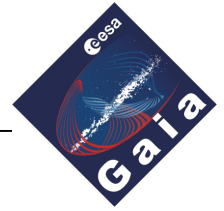
Performances synthesis for HR=20%:

B1V	V	7.0	12.0
	σ_r (km/s)	0.6	9.0
G2V	V	13.0	16.5
	σ_r (km/s)	0.8	14.6
K1IIIMP	V	13.5	17.0
	σ_r (km/s)	0.8	14.5
spec (km/s)		1	15

□ Baseline, no L3 CCD
 Required performances are met with an HR ratio lower than 20% and an assumed degradation due to radiation.



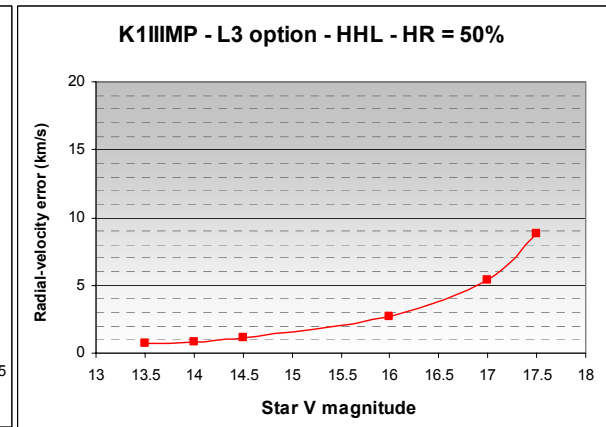
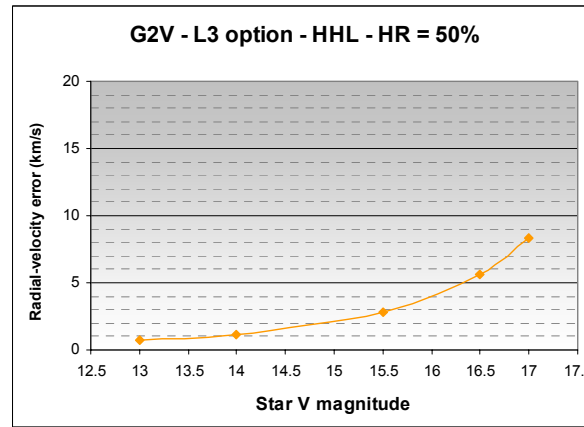
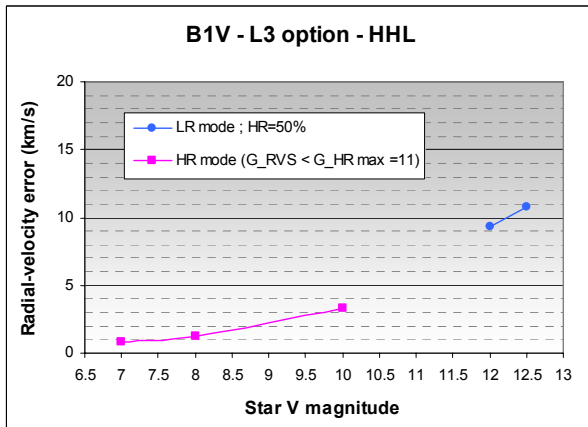
ESA AWG, Gaia RVS Optimization

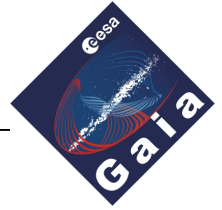


Performances synthesis for HR=50%:

B1V	V	7.0	8.0	12.0	12.5
	σ_r (km/s)	0.8	1.3	9.3	10.8
G2V	V	13.0	14.0	16.5	17.0
	σ_r (km/s)	0.7	1.2	5.6	8.3
K1IIIMP	V	13.5	14.5	17.0	17.5
	σ_r (km/s)	0.7	1.1	5.4	8.8
spec / design goal		1	1	15	15

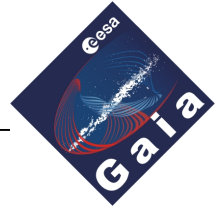
❑ Option, L3 CCD
 Required performances are met with margins. Faint stars design goal are met.





Requirements

- The updated set of RVS requirements has been discussed and agreed at the GST#17 for the:
 - MRD (Mission Requirement Document)
 - Spacecraft Requirements Specification
 - PLM Requirement Specification



RVS Related Milestones

- The following milestones are relevant for the RVS in the short term:
 - Finalization of RVS optimisation activities
 - RED CCD FMMR (Flight Model Manufacturing Release) by 31/10/2006
 - Focal Plane Assembly PDR (Preliminary Design Review) by 16/11/2006
 - Selection of contractor for RVS Optics by 21/11/2006
 - Proximity Electronic Module PDR by 15/12/2006