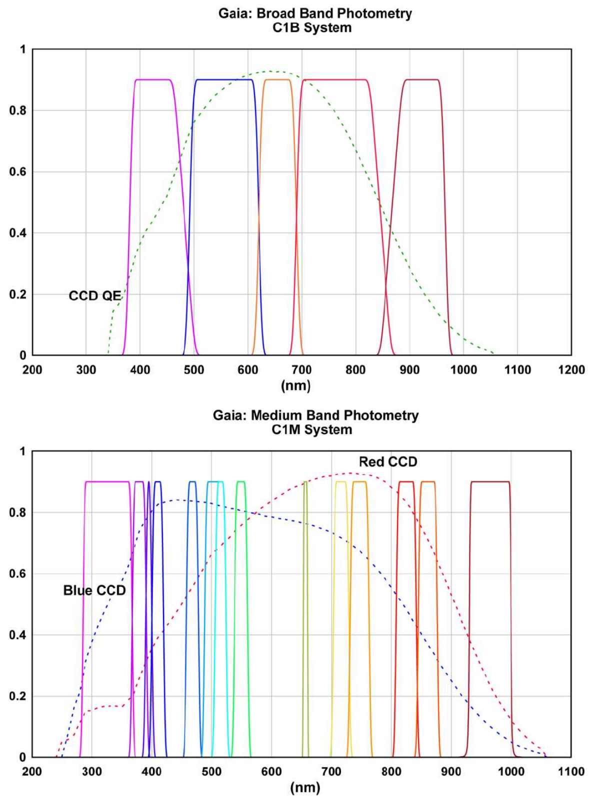

The originally proposed broad-band (top) and medium-band (bottom) photometry filters for Gaia. The dashed line corresponds to the response curve of the CCDs. The design of Gaia's photometric instrument has since been changed from interference filters to dispersive prisms. Photometric data are thus no longer limited to a finite number of bands but consist of low-resolution spectra covering the interval ~330-1000 nm.

Many ground-based photometric systems exist but none satisfies all the requirements of a space-based mission such as Gaia. Portions of the optical/near-infrared spectrum blocked by atmospheric O_3 and H_2O bands, and therefore not covered in ground-based systems, are observable with Gaia. Classical photometric systems have often been designed for specific spectral-type intervals or objects, while Gaia must cover the entire Hertzsprung-Russell diagram, quasar and galaxy photometry, solar-system object classification, and many more diverse objects. In addition, Gaia allows the extension of stellar photometry to yet-unexplored Galactic areas where classical classification schemes lose validity because of systematic variations in element abundances in stellar atmospheres and interstellar matter.

Considerable effort has therefore been devoted to the selection of an optimum photometric system for Gaia. In optimising the design of this system, the Photometry Working Group defined a set of scientific targets - single stars belonging to the Galactic halo, the thin and thick disc and the bulge - for which the photometric system should be optimised. These targets were selected so as to ensure that the scientific goals of the Gaia mission are met. In general terms, the selected photometric system should allow for the precise determination of the astrophysical parameters (e.g. $T_{\rm eff}$, log g, [M/H] and $A_{\rm v}$) of stars from all Galactic populations.

In December 2004, the Photometry Working Group recommended the implementation of a 19-band baseline photometric system based on interference filters, refered to as the C1B system with 5 broad bands covering the spectral region ~380-1000 nm and the C1M systems with 14 medium bands covering the range ~300-1000 nm (see figure). This recommendation, however, was made under the explicit assumption of a specific payload design featuring two telescopes (Astro and Spectro) with different spatial resolutions anf two photometric instruments (BBP and MBP) with different main aims, fields of view, focal-plane layouts, observing times, etc.

With the selction of EADS Astrium as Gaia prime contractor, the design of the scientific payload has been optimised further. Gaia's photometric instrument is now based on a dispersive-prism approach such that starlight is not focused in a PSF-like image and observed through an interference filter, but dispersed along the scan direction in a low-resolution spectrum. These spectra cover the wavelength range ~330-1000 nm. This approach provides optimum flexibility since it not only allows to reconstruct, *a posteriori*, the 19 photometric bands of the C1B and C1M systems but also arbitrary new bands, including ones 'intermediate' to those originally foreseen. For further details see the information sheet on the *Photometric Instrument*.