Optimized Baffle and Vane design for stray light suppression for Amon-Ra visible channel instrument

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The AmonRa instrument is the main payload of the international Earthshine mission, currently being developed, and it is to measure the global Earth albedo and the total solar irradiance from the L1 halo orbit using a visible imager and an IR bolometer. We report the optimized baffle and vane designs for effective stray light suppression of the AmonRa visible channel instrument. The first order analytic equation and ray path identification were used to define the initial baffle and vane parameters. The extensive forward and backward ray tracing runs were then employed to quantify the stray light level of the critical and illuminated objects along the signal path from the entrance aperture to the detector. This was followed by the ray tracing optimization for the maximum signal level, producing the final dimensional parameters of the baffle and vanes including surface finish and the vane tip geometry. The stray light suppression concept, computational details and the optimization results are presented together with the implications to the AmonRa visible channel optical performance.