solids on the Poincaré sphere satisfy these conditions. We found that, to first order, the number of Stokes vectors in an *optimal set* does not affect the robustness of the Mueller matrix measurements, and simulations confirmed this result. Finally, we deduced that in the case of a dual PEM Stokes polarimeter which is prone to phase errors, input Stokes vectors forming a cube on the Poincaré sphere whose vertices are equidistant from the areas prone to such errors represents a global optimum—a result which was also confirmed by simulation. We plan to report on experimental tests of these results in a future publication. Overall, this work presents a general framework for polarimetric optimization strategy, as well as furnishing practical 'recipes' for an optics researcher viz. experimental methodology for robust Mueller matrix determination with a dual-PEM polarimeter.