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## Polarisation adaptive optics for diattenuation aberration

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Polarization aberration, including retardance and diattenuation aberrations, has detrimental effects, especially for imaging techniques that rely on accurate polarization state or vectorial information. Polarization Adaptive Optics (P-AO) is a newly proposed advanced technique to compensate for polarization aberration in optical systems. While the correction of retardance aberration has been successfully demonstrated, the strategy for correcting another critical polarization aberration, diattenuation, remains unexplored. Diattenuation can disrupt the state of polarization and intensity values, impacting system resolution and the correctness of vectorial information due to non-optimal interference and inaccurate intensity distribution. Recently, skyrmions, which are topologically protected quasi-particles, have been recognized in the field of optics, sparking numerous new research opportunities. In this work, we utilize the topological number of a skyrmionic beam as a criterion to quantitatively discuss the correction ability of the P-AO technique regarding diattenuation aberration. We then apply this criterion to analyze the range of diattenuation that can be compensated by P-AO within the framework of a Stokes vector sensing/imaging system. This research not only facilitates the advanced usage of P-AO through a quantitative analysis of its correction limits but also extends the applications and utility of optical skyrmions.



**Short Bio:**

**Yifei Ma** earned a Bachelor of Engineering from Tianjin University, China and a Master of Science in Physics from Imperial College London, UK. Currently, he is pursuing a PhD degree in Department of Engineering Science at the

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