(e.g. sCMOS or similar) then each NGS requires a brightness of 13 photons which translates to a $m_V = 17.7$ target.

Using estimates of galactic stellar density, the number of targets of brightness $m_V \leq 18$ is between 600 and 4000 per square degree (for galactic pole and galactic centre pointing directions). In simulation field-of-view this is a density of 0.18 to 1 star respectively.
For the lower limit, this can be interpreted as a 18% chance there is a sufficiently bright NGS in the field of view and then the sample results from Table 1 Row A apply: a reduction in the motion of the DLR laser pulse by 50—90%. There is a 1% chance that 2 stars are present in the field of view and it is vanishingly small for 3. For the upper limit, there is approximately 1/3rd chance to find 1 star, 1/5th for 2 stars, and 6% for 3 stars of sufficient brightness. Therefore, it can be expected that a reduction in the beam wander of at least 2/3rds from using stars to estimate beam wander is achievable.

7. CONCLUSION

The study of using stars to estimate angle-of-arrival for predicting, and therefore compensating for, beam wander of projected laser illumination for enhancing SST is found to be practicable and realistic for a reduction of at least half, for observation directions away from the galactic pole 50% of the time. This is the worst case scenario and therefore suggests that this approach to beam-wander compensation is not only feasible but will also be practical for many observations. The main conclusion I draw regarding how to implement the estimation is that simply averaging measurements (or using them directly if only one star is sufficiently close) is effective. The next steps are to understand how to utilise the noise from any star to produce a strategy that can take into account both bright and faint stars.

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