We introduce a method for determining the position and orientation of fixed dipole emitters based on a combination of polarimetry and spot shape detection. A four-way polarizing beam splitter architecture for measuring linear polarization components at 0, 45, 90, and 135 deg [1] gives rise to a division of amplitude of the emission spot as well as to distinct spot shape variations depending on the dipole orientation of the emitter. These spot shape variations are well described by an effective Point Spread Function model based on Hermite functions that provide significant computational advantages over the exact vectorial description of dipole image formation. The position, orientation and defocus induced asymmetry can be estimated from the set of four polarization images using numerical optimization of the likelihood function, assuming shot noise only. Our method compares well with existing methods [2]. We present simulation results (see Figure, assumed parameters NA = 1.25, n = 1.33, 80 nm pixels in object space, \( \lambda = 500 \text{ nm} \)) showing that the realized localization uncertainty is comparable to the free dipole case in which spots are rotationally symmetric, i.e. following the rule \( \sigma / \sqrt{N} \), with \( \sigma \) the spot width and \( N \) the total signal photon count. This result holds for all dipole orientations, for all practical signal levels, and for defocus values within the depth of focus, implying that the massive localization bias for defocused emitters with tilted dipole axis found with Gaussian spot fitting [3] is eliminated. The azimuthal dipole angle can be determined with an accuracy that is reasonable well described by the rule \( \sqrt{2/N} \), recently proposed in [4]. The polar dipole angle follows this bound only qualitatively.