PHY427 Lab 2 Summary: GAUS

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A common misconception is that light propagates linearly in space, but this propagation would necessitate that the light be a plane wave, having infinite extent in the plane orthogonal to its axis of propagation. This is a decent approximation for many macroscopic phenomena, as far from a source, EM waves and light can behave approximately as plane waves do, but if a barrier such as a small hole in a surface is introduced, the wave-front's self interference which was previously keeping the wavefront flat is now gone, and it propagates outward spherically from the small hole. This divergence of light can be reversed to understand the focusing of a beam. To focus a beam, an otherwise spherical wavefront must be concentrated back down to a finite point with finite intensity. These finite intensity constraints do not align with geometrical optics, and through data analysis on pages 62-65 of my lab notebook the intensity distribution of a focused beam is analyzed to show that light behaves as a Gaussian beam rather than in the way described with traditional geometric optics. Then, a procedure for measuring the radius of curvature of a beam is described in detail, with preliminary measurements being taken for conceptual verification.