PHYS 234 Assignment 5

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1. **A beam of identical neutral particles with spin $\frac{1}{2}$ travels along the y axis. The beam passes through a series of two Stern-Gerlach spin analyzing magnets, each of which is designed to analyze the spin component along the z axis. The first Stern-Gerlach analyzer allows only particles with spin up (along the z axis) to pass through. The second Stern-Gerlach analyzer allows only particles with spin down (along the z axis) to pass through. The particles travel at a speed v between the two analyzers, which are separated by a region of length d in which there is a uniform magnetic field B_0 pointing in the x direction. Determine the smallest value of d such that 25% of the particles transmitted by the first analyzer are transmitted by the second analyzer.**