Polarization effects with offset launch into MM fiber.
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10/26/2004

To follow up on the 10/25 Task 4 meeting and David's request for comments on his note,

In figure 3b there is a plot of the normalized power for HMG(2,0), HMG(0,2), HMG(1,1) and the total power for MGP3. The Laguerre-Gauss group LGG has a radial mode LGG(1,0) which is connected to the HMG modes by LGG(1,0) = HMG(2,0)+HMG(0,2). I believe if David looks at the power in LGG(1,0)=HMG(2,0)+HMG(0,2) (that is, LGG(1,0)^2) that this power will be constant with polarization angle. This will show that to some extent HMG(2,0) and HMG(0,2) are degenerate just like the cosine and sine modes are degenerate for the Laguerre-Gauss case.

I have these comments on the conclusions:
1. The mode power distribution (MPD) is independent of the polarization of the launch.
AGREE. By this we mean the distribution of power between the mode groups.
2. The launched power is not initially equi-partitioned between the individual modes within a group.
AGREE.
3. Rotation of the launch polarization vector... Changes the distribution of power between the modes of a mode group
DISAGREE(?). If the modes and mode groups are designated by (mu,nu) corresponding to the scalar wave equation solutions, so that the modes within a mode group are those modes (mu,nu) with 2*mu + nu - 2 = constant, (this is the Laguerre-Gauss notation and same notation used by Ian White & Cambridge group), then the distribution of power within the non-degenerate modes remains a constant as the polarization vector rotates (or equivalently, as the launch position moves around the core staying at a fixed radial offset). In the Laguerre-Gauss notation the 'mode' (mu,nu) corresponds to 4 degenerate modes corresponding to cosine/sine azimuthal modes and two polarization modes. As the polarization vector changes the total power in the 4 degenerate modes stays the same and in that sense the distribution of modal power within the group stays the same. However, the distribution of power between the 4 degenerate modes can change. Because the 4 degenerate modes have the same propagation constant beta and the same mode delay tau changing the distribution of power should not affect the output pulse.

NOTE ON THE USE of GAUSS-HERMITE functions. For an index profile which is radially symmetric but which is perturbed from a perfect parabola, the solutions to the scalar wave equation when solved via a F(r)G(theta) separation of variables approach will give slightly perturbed propagation constants and mode delays with the degenerate modes tracking together. If the scalar wave equation is solved via a A(x)B(y) separation variables approach (which would converge to the Gauss-Hermite functions in the limit of a parabola), it isn't clear to me how this works and I don't recall applicable journal articles.

4. There may be a variation in the impulse response with rotation of polarization under the following conditions:
4a. Mode mixing within groups is incomplete.
DISAGREE.
4b. Perturbations have caused delay splitting within mode groups

DISAGREE assuming applicability of scalar wave equation and axisymmetric perturbations

4c. The light excites mode groups with delay splitting

DO NOT UNDERSTAND. (MPD stays constant according to point 1)