Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Turbulence and Solar Energetic Particles in coronal shocks LUIS GARGATE, GoLP/Instituto de Plasmas e Fusao Nuclear, IST, Portugal, RICARDO FONSECA, DCTI, Instituto Superior de Ciencias do Trabalho e da Empresa, Portugal, ROBERT BINGHAM, SSTD, Rutherford Appleton Laboratory, UK, LUIS SILVA, GoLP/Instituto de Plasmas e Fusao Nuclear, IST, Portugal — We use a kinetic ion / fluid electron numerical simulation approach (dHybrid) to study the propagation of a Coronal Mass Ejection (CME) shock in the outer corona environment. We consider a CME driving a fast magnetosonic shock, with shock parameters known to correlate well with Solar Energetic Particle (SEP) events. For these events, SEPs with energies up to several hundred MeV are commonly measured at 1 AU. Results from dHybrid show the self-consistent formation of Alfvèn waves upstream of the shock, with turbulence building up due to wave breaking, and strong particle acceleration. Energy gains of up to 110 times the maximum possible energy gain in one shock crossing are measured. For the most accelerated particles, the observed energy gain is $\sim$ quadratic in time, during the simulation time frame, consistent with surfatron acceleration, while for another less energetic set of particles the energy scales with t^1/2 consistent with diffusive shock acceleration. The observed energy gain would allow for a typical solar wind proton to reach an energy of hundreds of MeV in some minutes. A thorough discussion about the observed acceleration mechanisms will be presented.

Luis Gargate
GoLP/Instituto de Plasmas e Fusao Nuclear, IST, Portugal

Date submitted: 18 Jul 2008 Electronic form version 1.4