

Overlay of real data with simulation

As proton bunches collide at the LHC, there are several sources of backgrounds that accompany the physics being produced from the "hard", high-pt pp collisions: additional pp interactions, "cavern neutron/photon haze", beam halo, beam gas interactions, etc. The ATLAS simulation would like to model these backgrounds as accurately as possible.

We soon expect collisions at the LHC, and will use real data from "random" events to measure these backgrounds, and directly include simulated events "overlaid" on top of the real data background events. Your job would be to study the results of these overlaid data/MC events to help verify that the simulation is doing things correctly, and to compare the real data to simulated backgrounds, for instance.

In addition, you can study a physics analysis that uses muons, such as the "lepton-jets" search, to see the effect of real beam-halo background, for example. What is learned there could then be used by many others in their analyses.