

Blind SUSY Analysis

We are supposed to send some thoughts to Dan to report to Stat WS.

Some basic thoughts here... more meant to get us discussing

Blinding

- The conflict appears to be between:
 - Making an unbiased measurement
 - Not missing a huge signal
 - Are these analogous to Type I/II error?
- Auxiliary benefits of blinding:
 - Blinding provides some level of organization.
 - Well defined procedures
 - Overlapping signal boxes

Blinding Techniques

- For SUSY searches, it seems that 2 basic techniques have been suggested:
 - Defining Signal/Background regions
 - Define selection/procedure on MC
 - Measure Bkg properties (rate/shape) from bkg region, w/o looking at signal.
 - Derive N SUSY in signal region, using Bkg region estimate.
 - Problem: signal contamination of bkg \Rightarrow more conservative \Rightarrow Ok?
 - Bkg regions are signal regions of other groups!
 - Signal regions are difficult to define.
 - Look at subset of data before looking at full dataset
 - I think the main point is to not miss a big signal...
 - Not really suitable for bkg estimation... need full stats of bkg.
 - Must correct for “look many times” effect. What’s the best time to look?

➡ Are these complimentary?

Procedures

- Before data-taking we will have decided on some procedures, including cuts, etc...
- Once we get the first data, we want to look to make sure there isn't a big obvious signal.
- We do not want to do anything that is motivated by the change to signal significance (especially any enhancements).
- Once we look at the data (even if we don't blind), we may want to change something because:
 - Somehow realize Bkg Estimation is not good (shape?)... \Rightarrow add extra bkg?
 - See detector effect \Rightarrow new cuts to clean up \Rightarrow less signal?
 - If we blind these are reflected in the systematics!
- I think some people want to play with the data until they get a peak they cannot get rid of...

Our suggestion?

- Define signal/background regions... look at Background regions as data comes in.
- We take a first look at all of signal and background region with small subset of data... (should we study what is the best time?)
- We should define a set of validations before taking big steps. Ex:
 - Don't look for SUSY before some official calibrations are ready.
 - make sure Z,W,top mass are OK.
 - Electron/muon eff/fake rate understood over relevant parts of detector.
 - No surprises in Bkg regions?
- We should take steps as a group...