FYSSP100

H. Alida F. Hardersen
Fysisk Institutt, Universitetet i Oslo
(Dated: August 2, 2020)

ABSTRACT

I. INTRODUCTION

II. COUNTING EXPERIMENT

III. LIKELIHOOD

IV. OPTIMIZING THE MASS WINDOW

V. PART 1

a) Find the mass window that optimizes the expected significance. Make a plot of the significance as a function of the width of the mass window around 125 GeV and explain the structure you see.

Optimal expected significance is 2.04 with a mass window 7.15 GeV.
Optimal observed significance is 3.92 with a mass window 2.85.
See figure 2.

For 5 times higher luminosity the maximum expected significance is 4.79 at mass window width 6.55.
At what Luminosity do you expect to be able to make a discovery? Note: The expected significance is more than 5!

The lowest luminosity necessary to have an expected significance of 5 or more is a luminosity 5.51 times the initial luminosity, where the significance is 5.07 at a mass window 6.15.

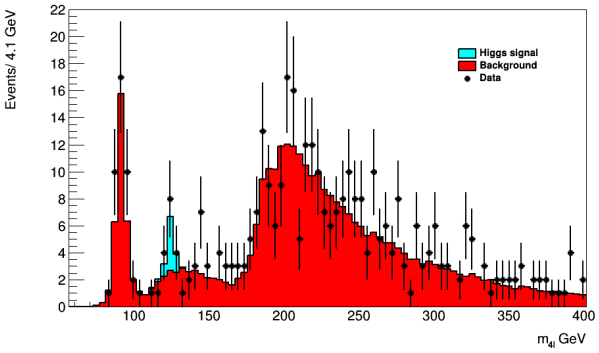

FIG. 1: CAPTION

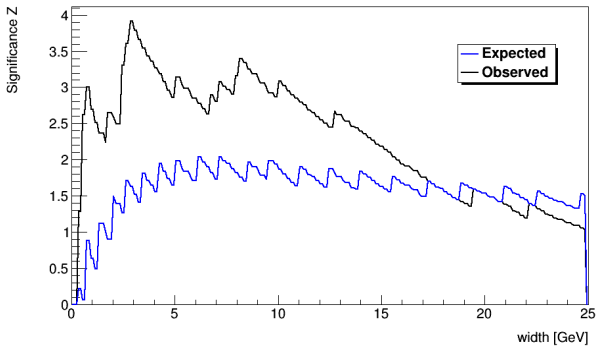

FIG. 2: CAPTION

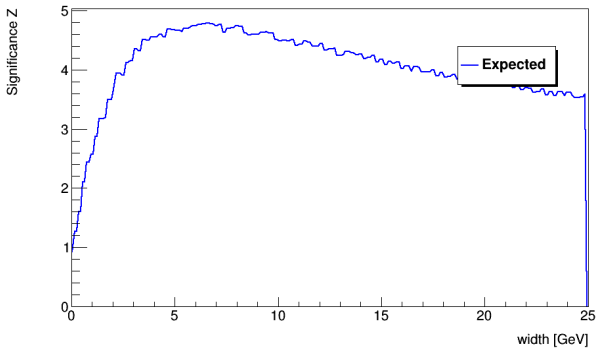

FIG. 3: