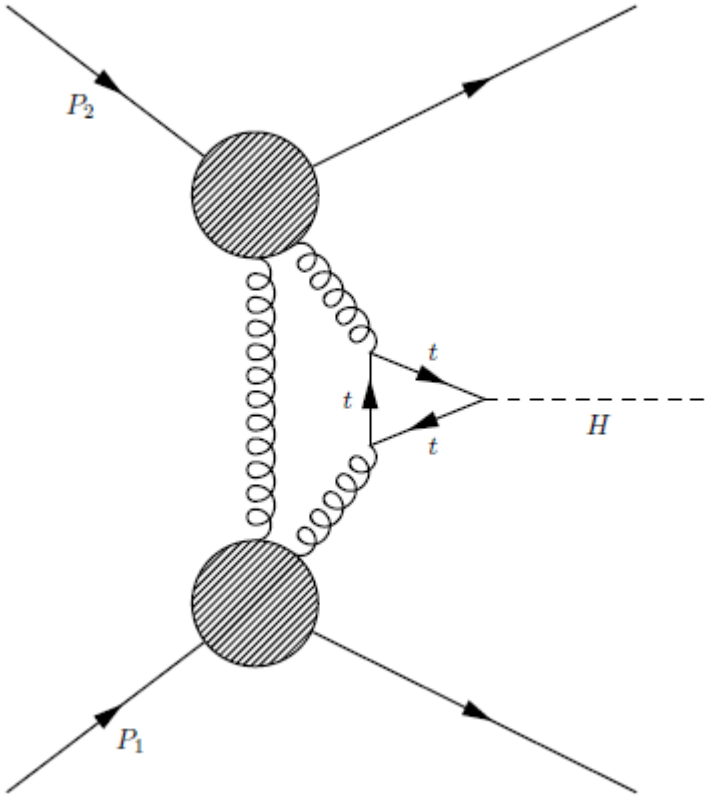
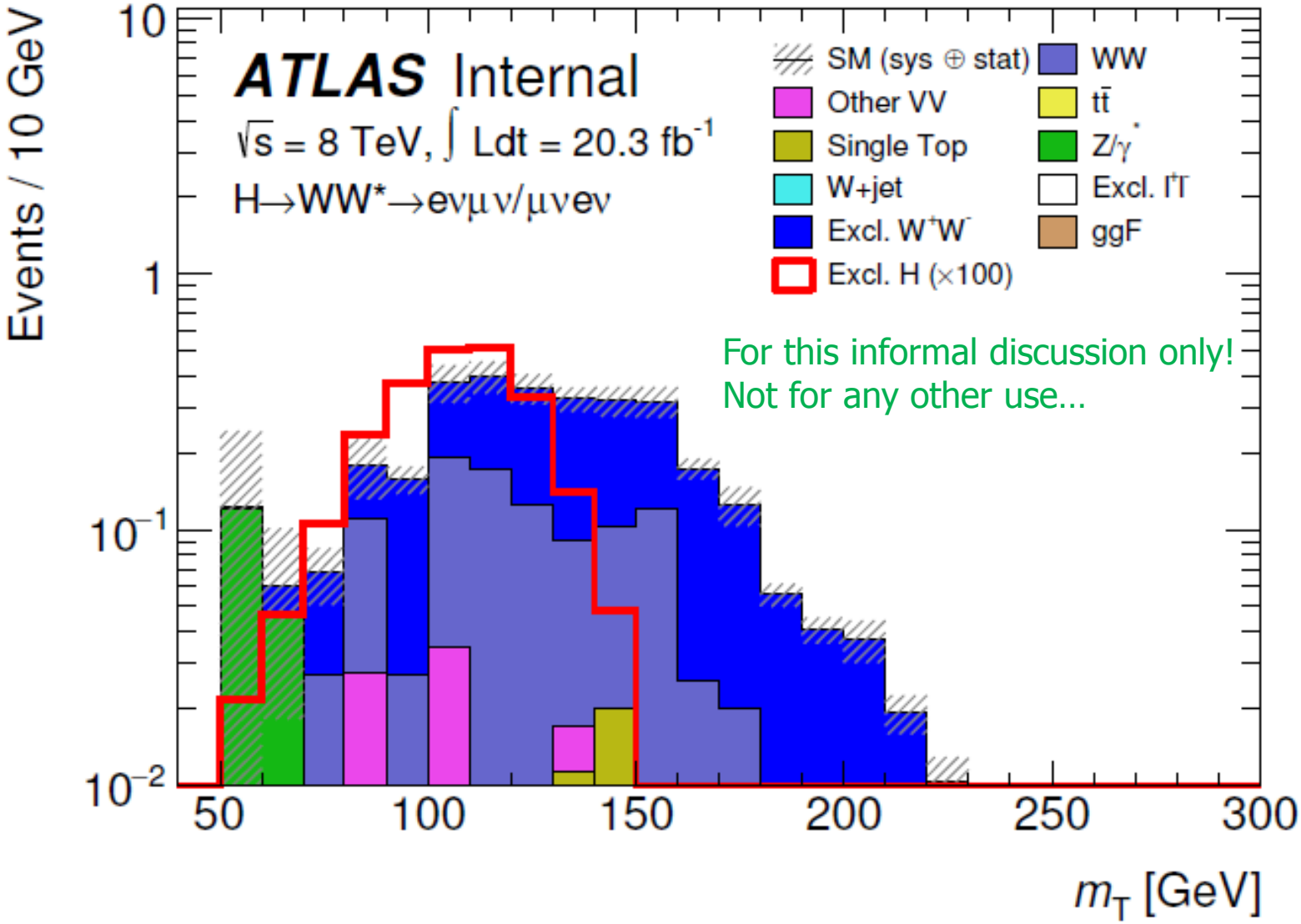
Diffractive H (BEH)



and H will decay subsequently in WW

The final state is very close to exclusive WW production…

2 models predict (total) cross sections for this process (at 8 TeV) of **3 fb** and 300 fb…

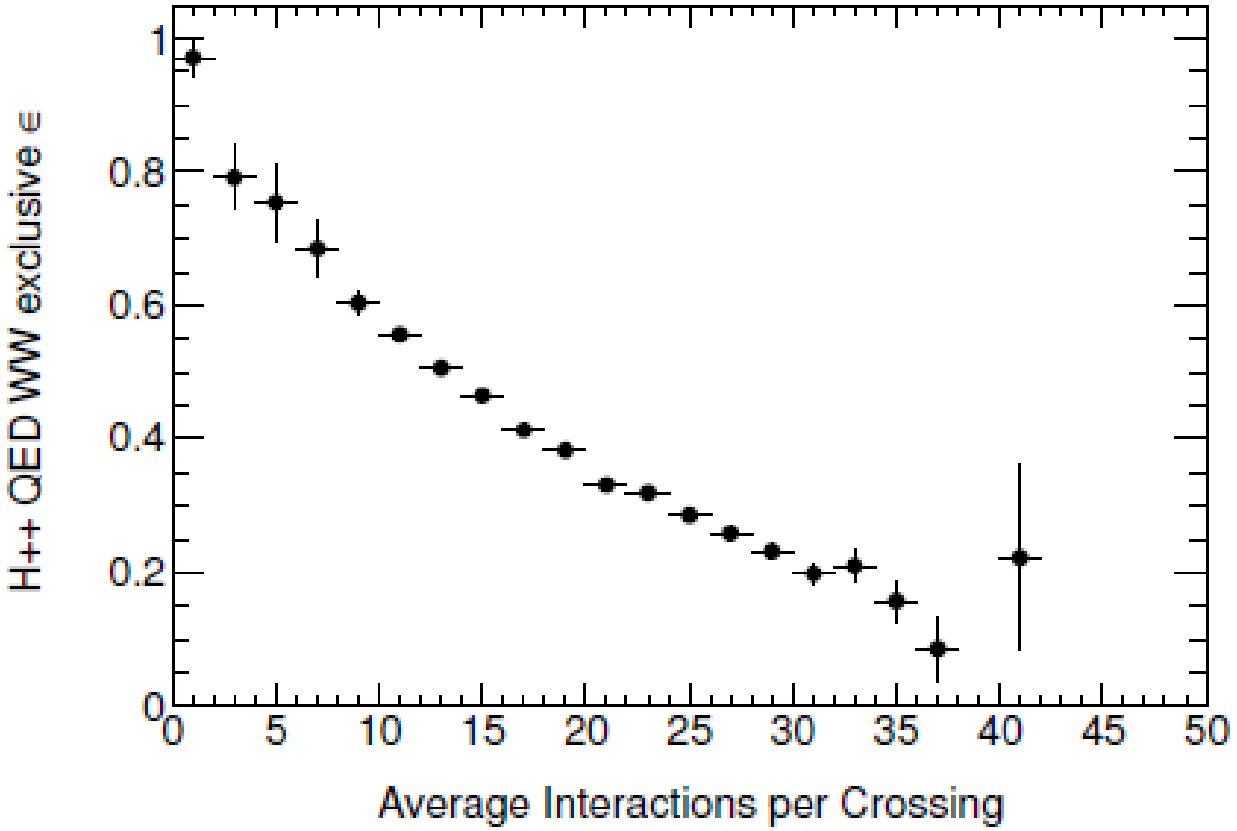


$m_T^2 = 2|\mathbf{p_T}(1)||\mathbf{p_T}(2)|(1 - \cos\varphi_{12})$

Note: the transverse mass has an end point at the real mass $m_T < M$ and has the advantage to be invariant / boost in z

Efficiency of the selection as a function of μ
# of pile up events…

<u>Conclusion:</u>
Not bad at all!



The typical limit we can expect from data already on tape and a nominal analysis is something like **600 fb**…

The analysis is a <u>direct consequence (continuation) of the exclusive WW analysis</u> (as almost obvious from my previous slide)

Magnetic Monopoles

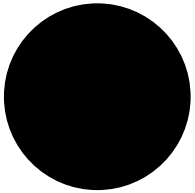
In a system {e (elect. charge) and g (mangnetic monopole)} =>
J=∫dr rx(ExB)/4πc =…=**eg/c** « quantised in QM » = **n ħ/2**

$$\frac{g_D e}{\hbar c} = \frac{1}{2} \quad \Rightarrow \quad \frac{g_D}{e} = \frac{1}{2\alpha_e} \approx 68.5$$

What can we conclude from this?

$$\alpha_m = \frac{g_D^2}{\hbar c} = \frac{1}{4\alpha_e}$$

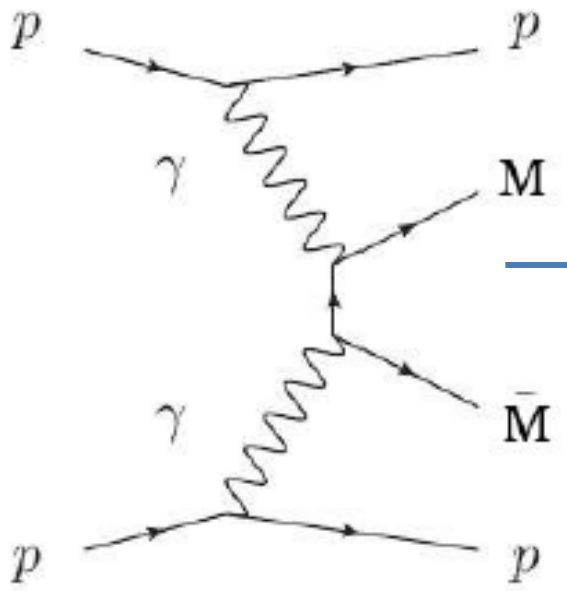
Electric charge
α<<1 => light particle



Magnetic monopole
1/α>>1 => massive
and strong force between M and anti-M
if produced together…

In terms of ionization energy loss at high velocity, a monopole with the Dirac charge corresponds to an electrically charged particle **with charge |z|e ~68.5e**
A monopole would thus manifest itself as a HIP, as would any highly charged stable particle.
Standard studies are based on this signature (-> no observation)…

If we are willing to make it from EM processes, this means:



Or the pair MM fuses (box of M) and produces photon-photon

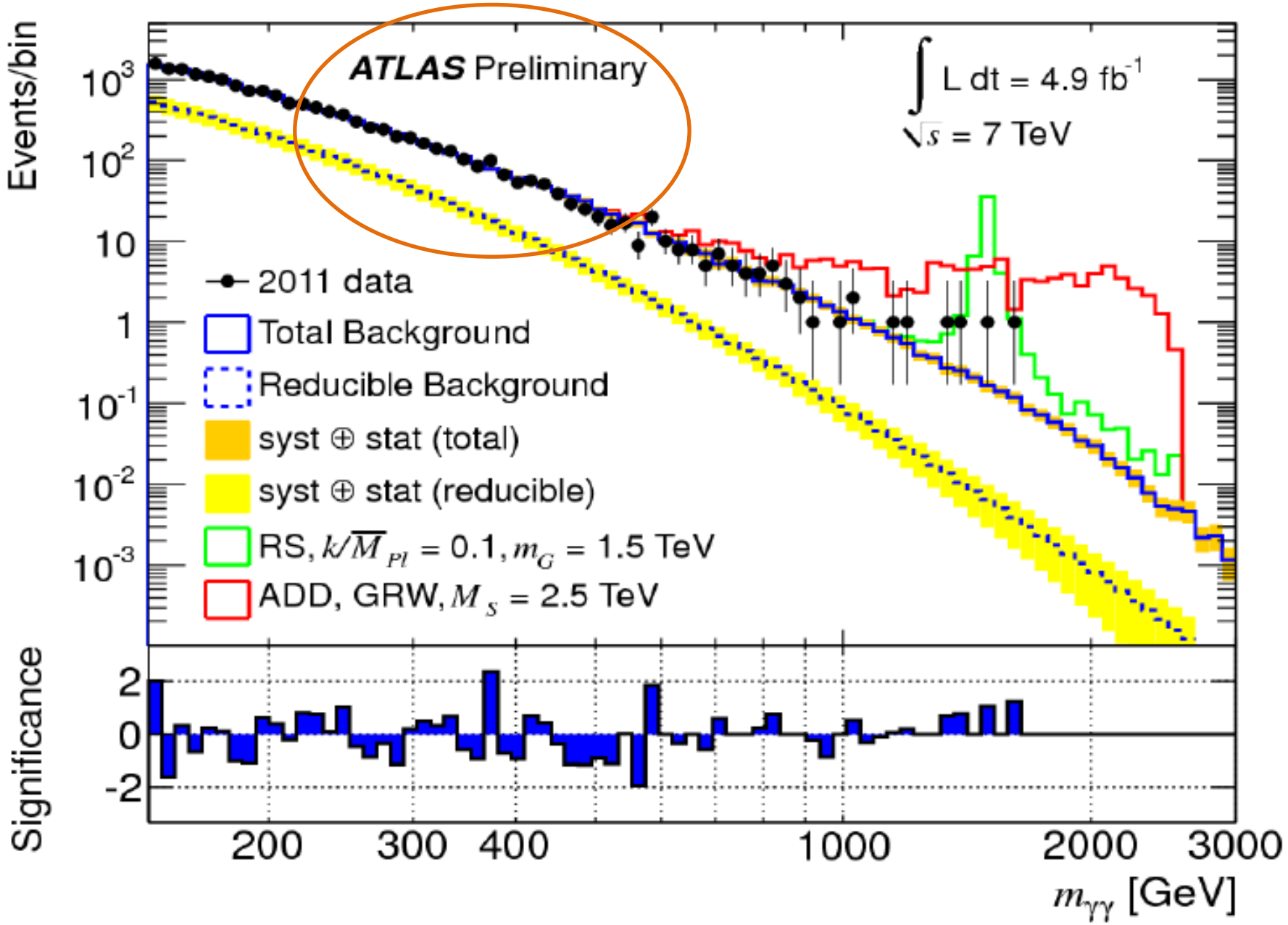
Or the pair MM makes a bound state: monopolium, which then decays in photon-photon *the most probable from* α_m ?!

In any physics-cases, we need to detect:

- Invisible particle(s)
- or a pair of photons (with intact protons)

In both cases, protons need to be tagged and the mass of the final state needs to be determined from the protons …

Standard (inclusive) sample of photon-photon final states



AFP and invisible particles – strategy
This may be the AFP configuration in 2 years…

- Double proton tag

– need inclusive trigger (requiring an invariant mass above a certain threshold) using AFP

- Veto on high-pT activity in the event (leptons, photons, jets, MET)
- Data-driven estimate of the backgrounds is essential

can be used to detect invisible particle(s):

Pair-produced particles
500 < m < 900 GeV

Singly produced particles
1000 < m < 1800 GeV