

# Material for the Discussion

# Near Future Expectations

- Several **constraints** from direct and indirect Dark Matter Searches and from Dark Matter **production** at LHC
  - So far hints of DM particle from several sources:
    - Excess in gamma-ray from Fermi LAT experiment
    - Excess of positrons from Pamela, Fermi and AMS experiments
    - Annual modulation from DAMA/LIBRA and CoGeNT
- We believe that the LHC community **shall** give **its contribution** to this cause

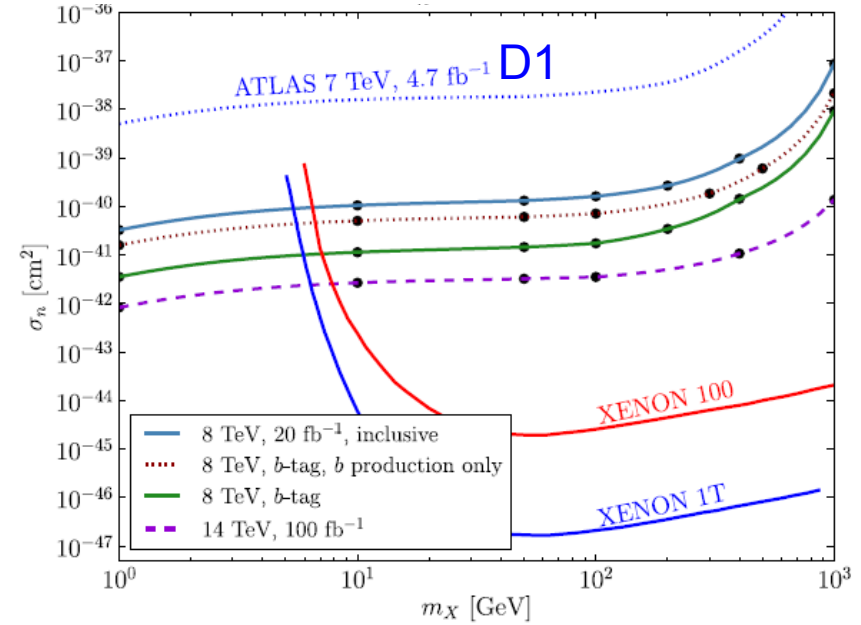
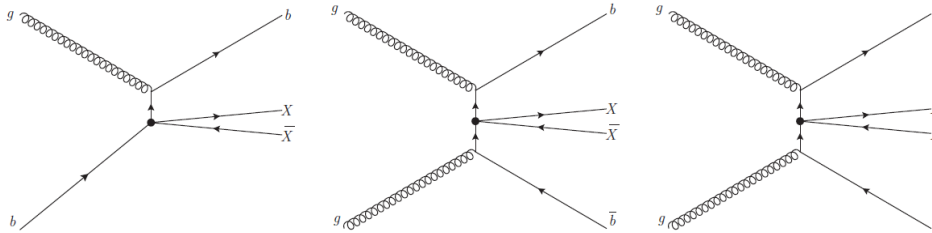
# Considerations

- The material that we have to bound the DM from the particle physics point of view is enough to **start a working group** made of particle physics Experimentalists and Theoreticians
  - Provide a **coherent view** of what we have
    - Theoretical point of view: make easy **interpretation** of experimental results
    - Experimental point of view: match theo needs/ideas and fully exploit the ATLAS/CMS potential **combining the results**
  - Provide a **coherent framework** to decompose the DM puzzle (models and variables)
- A lot more data have to come and all above is essential not only in view of bounding the DM particle phenomenology, but also **to be ready** to see DM production at LHC (either because we are the first to see it or to confirm/confute what direct and indirect searches will find)

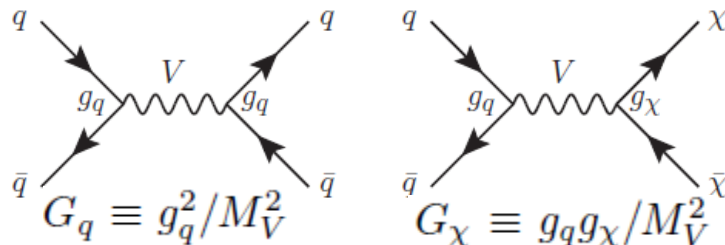
# Examples of Interplay

T. Lin et al.

1



2

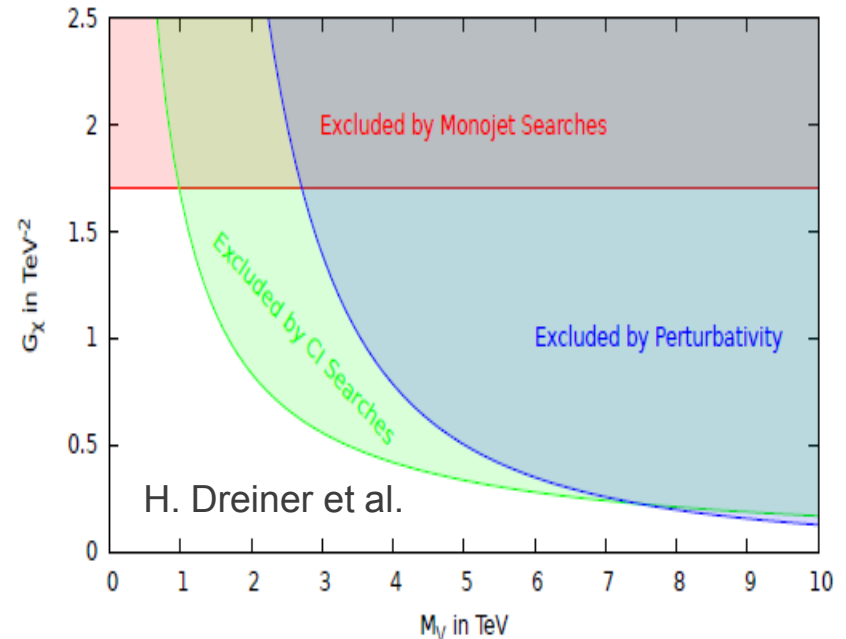


$$G_\chi = \frac{g_\chi}{M_V} \sqrt{G_q}$$

$$g_\chi \leq \sqrt{4\pi}$$

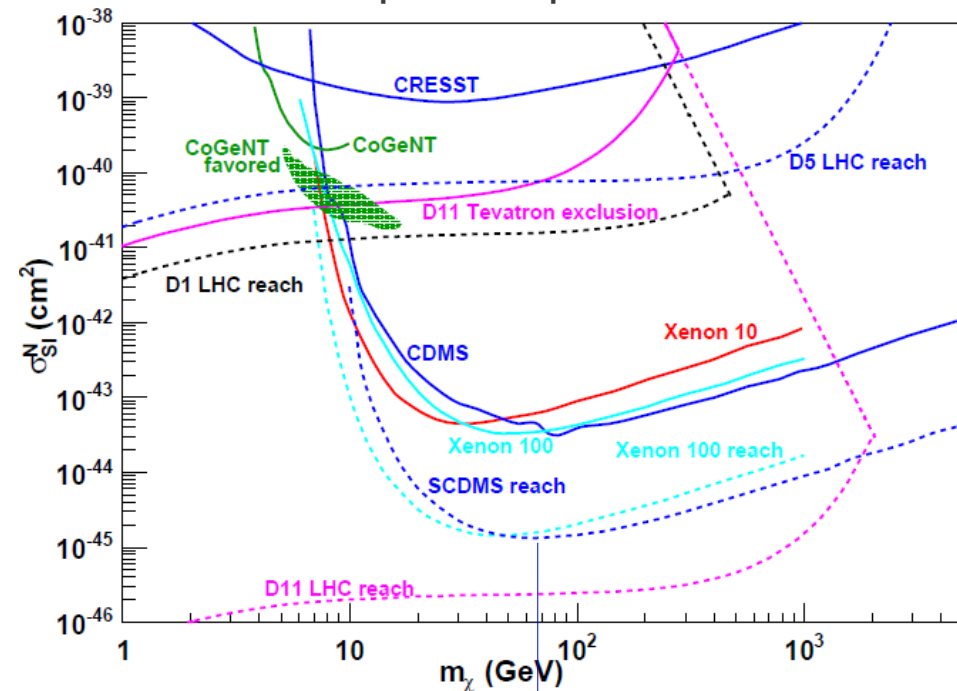
✚ limits on  $G_q$  from contact interaction analyses

→ indirect limits on  $G_\chi$

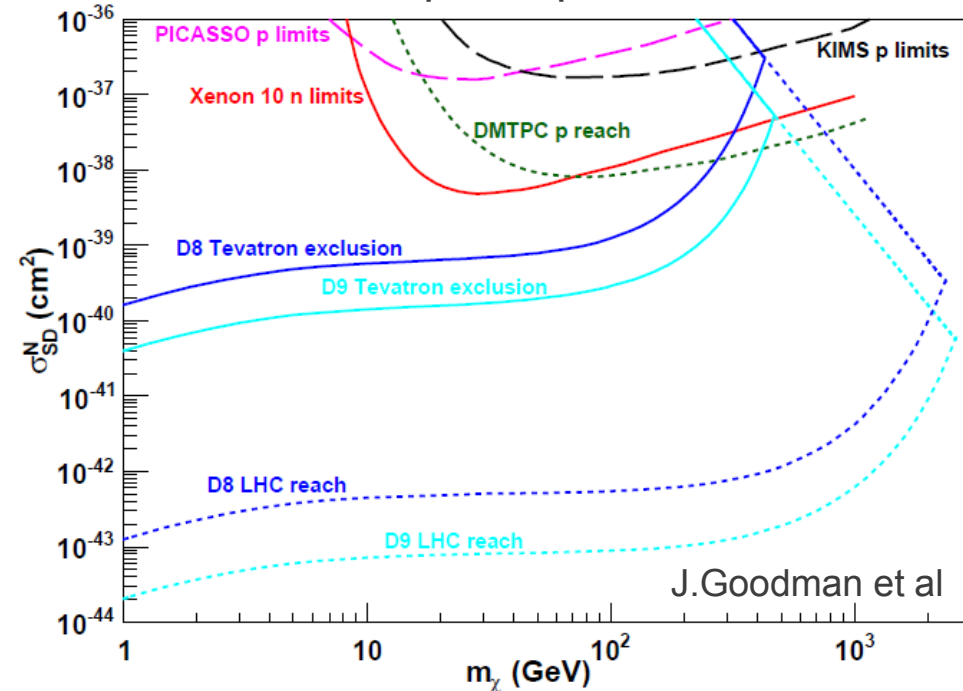


# LHC Prospects at 14 TeV, for $L=100/\text{fb}$

spin-independent



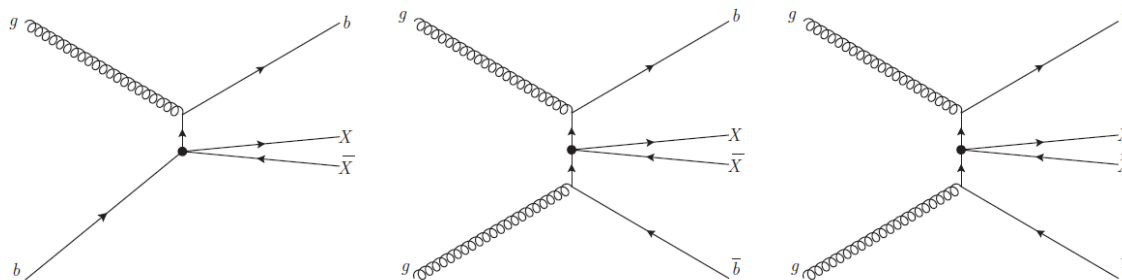
spin-dependent



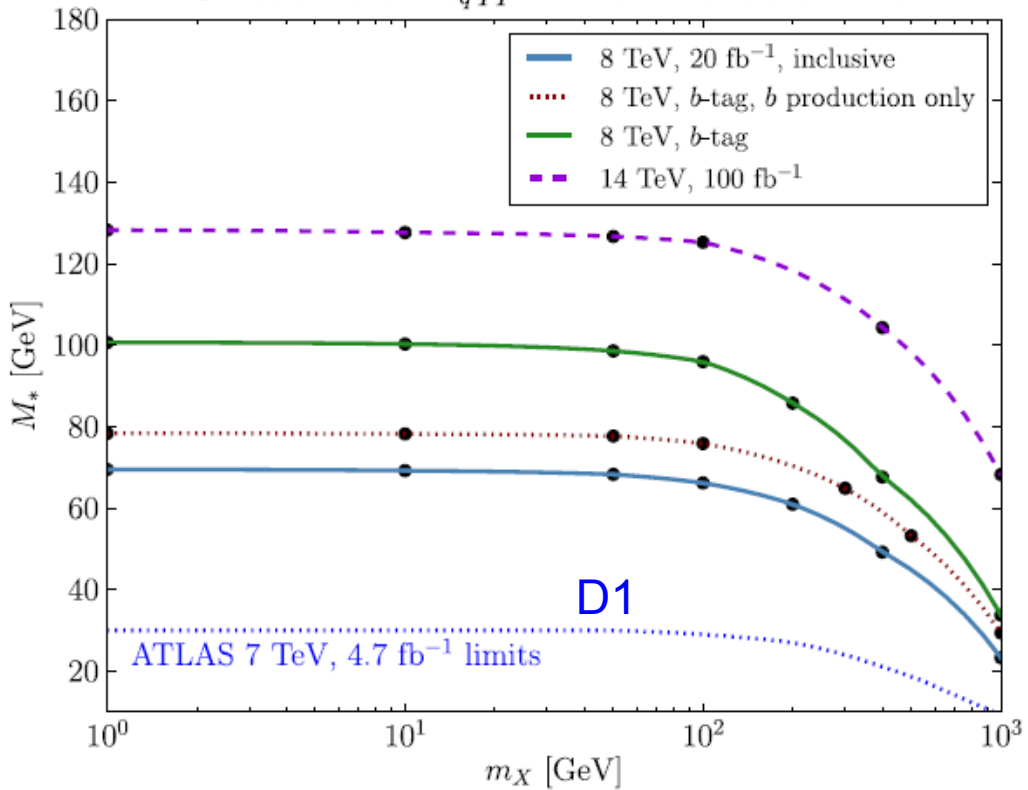
Limits will go down to  $10^{-48} \text{ cm}^2$

- Discovery potential from LHC is humongous. However direct detection experiments will improve too
- Should find a common ground for better comparison

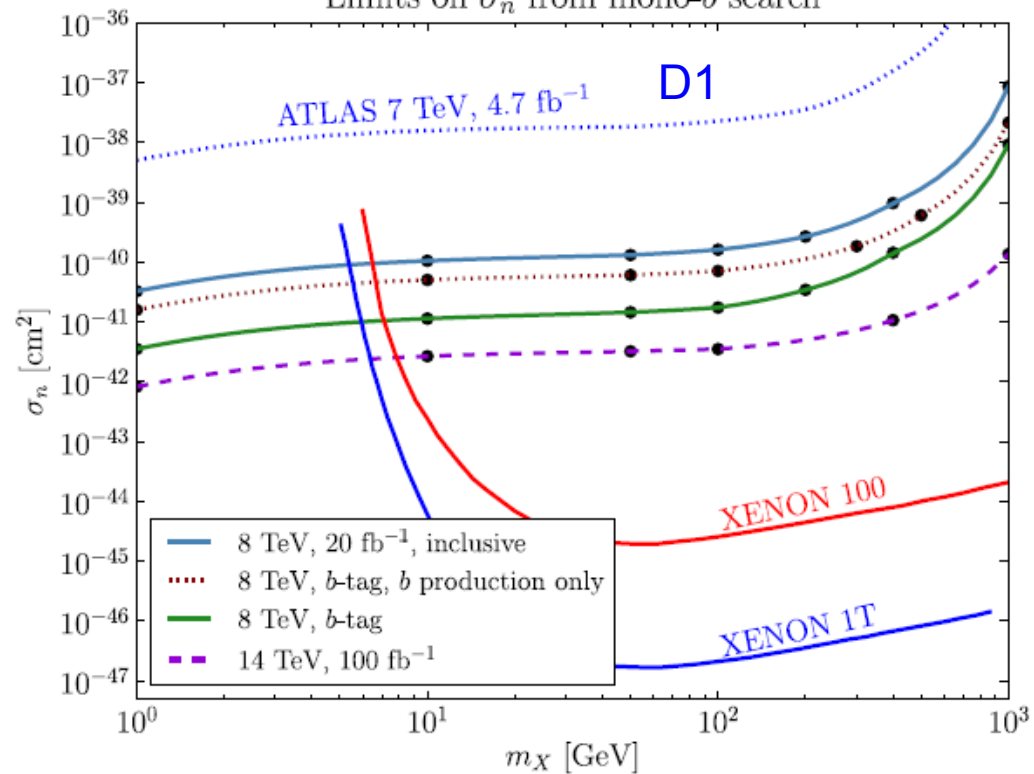
**More Material**



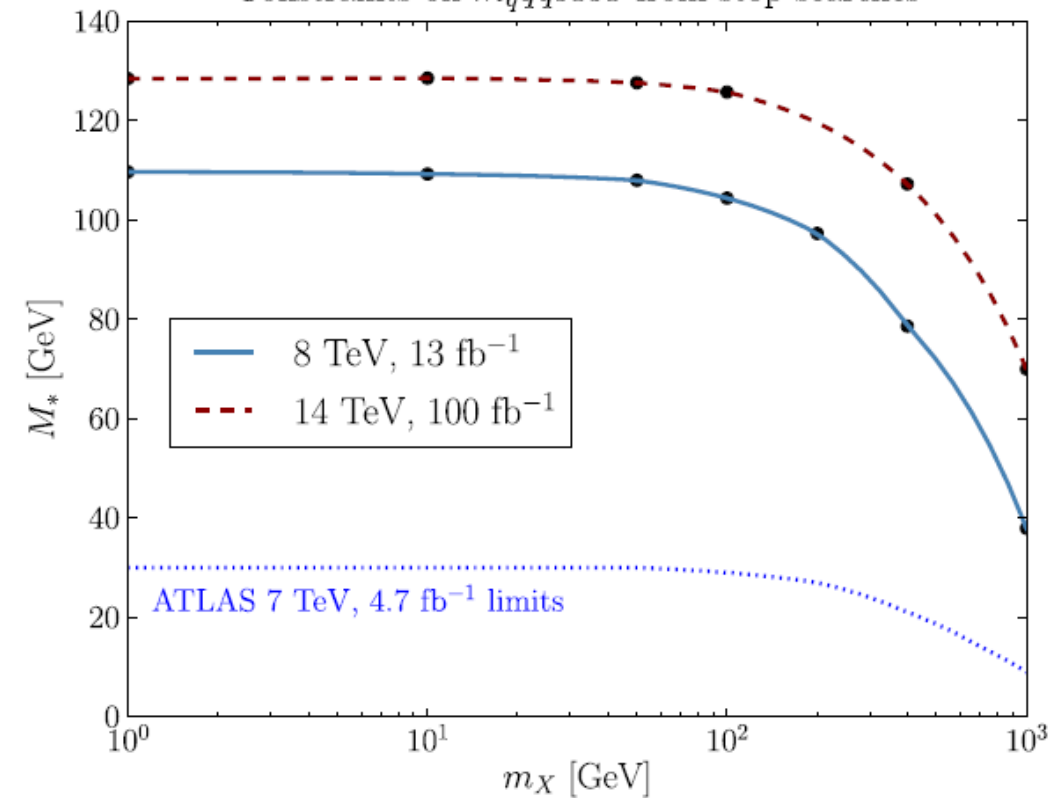
Constraints on  $m_q \bar{q} q \bar{X} X$  from mono- $b$  searches



Limits on  $\sigma_n$  from mono- $b$  search



Constraints on  $m_q \bar{q} q \bar{X} X$  from stop searches



Limits on  $\sigma_n$  from stop searches

