Prospects for discovering a neutrino line induced by dark matter annihilation

Laurent Vanderheyden - ULB

In collaboration with C. El Aisati, C. Garcia Cely and T. Hambye.
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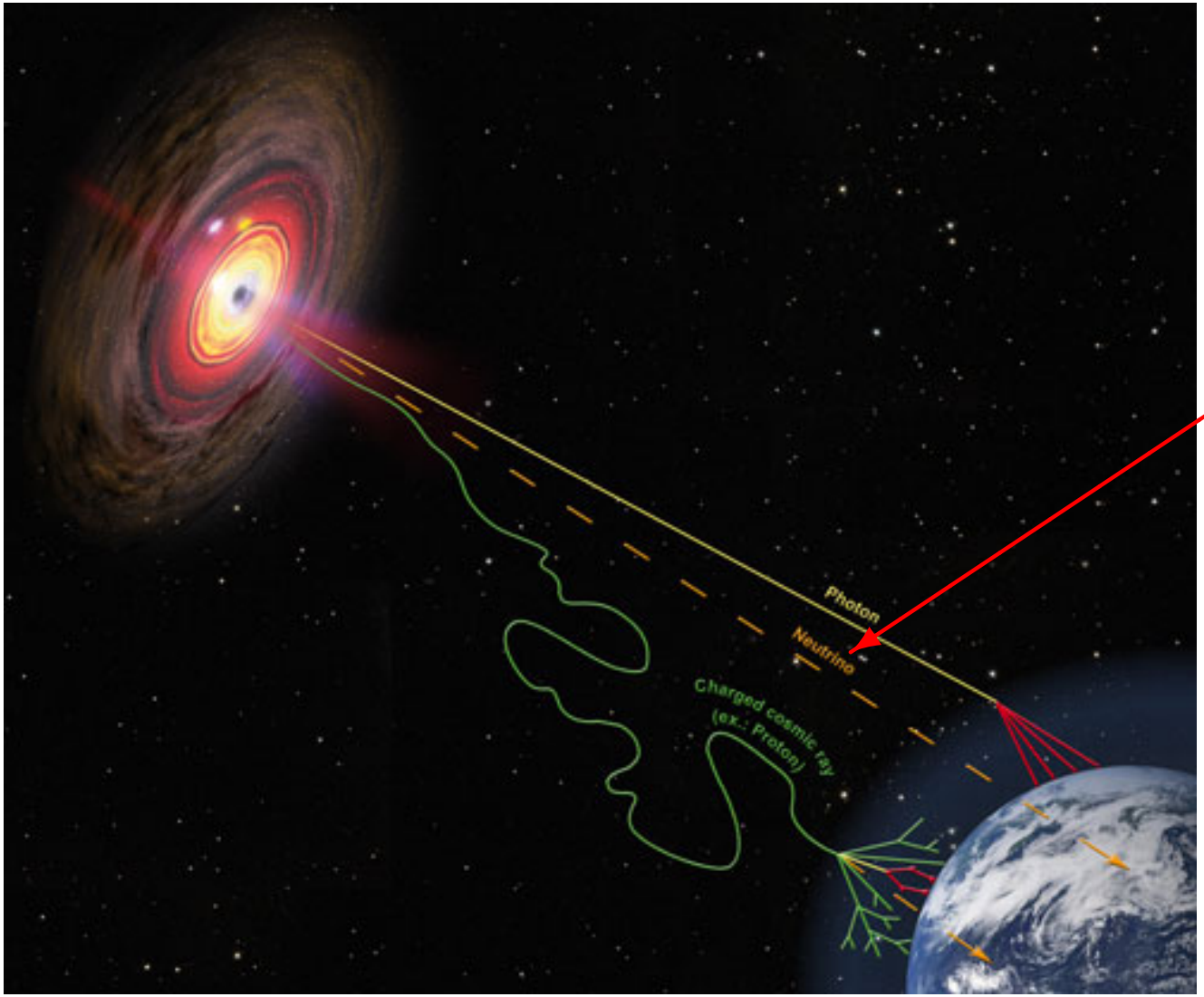
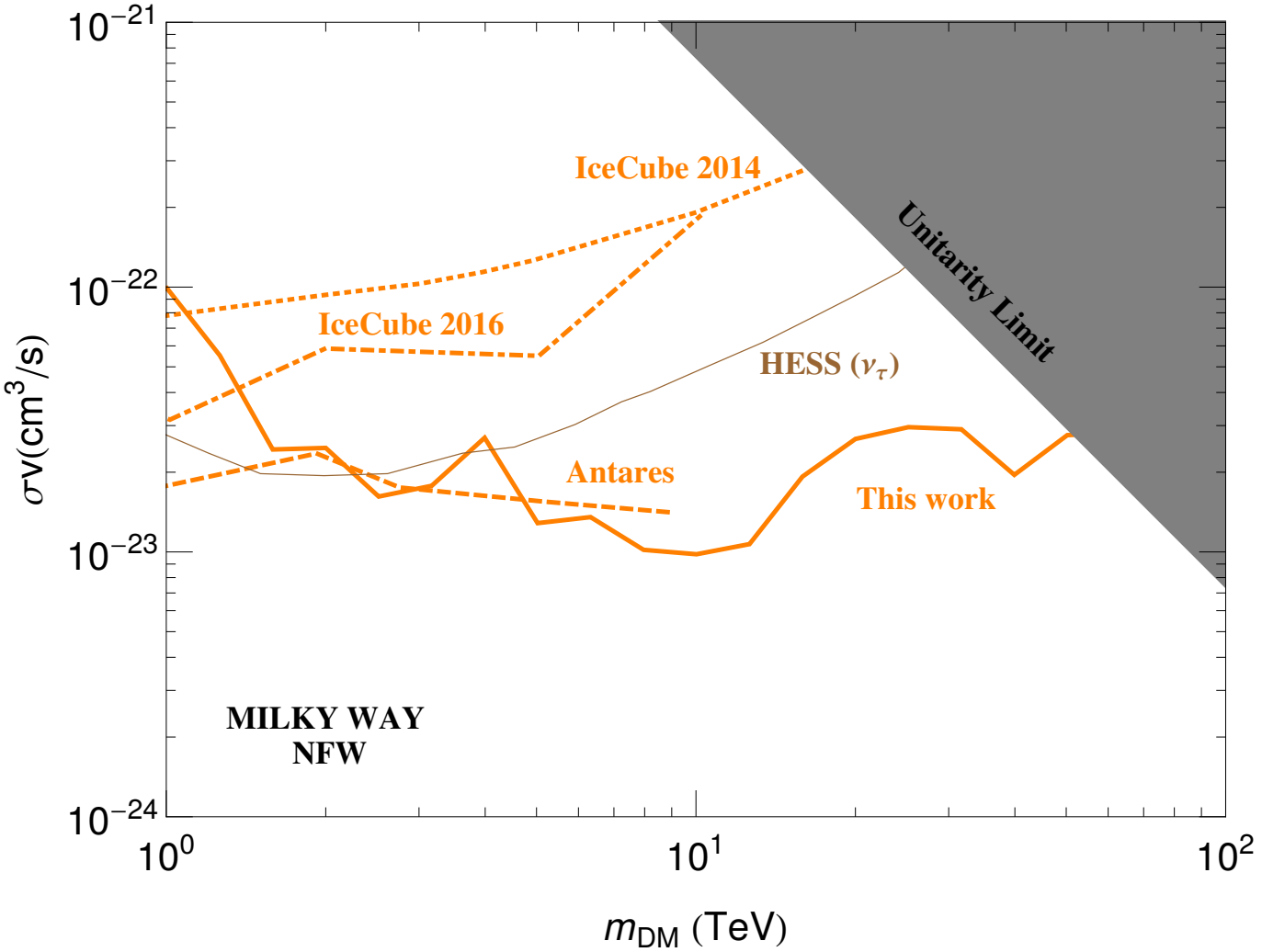
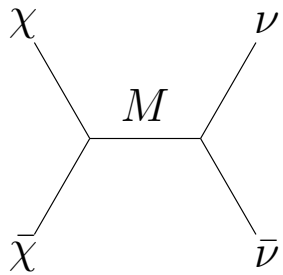
Neutrinos and Gamma rays lines

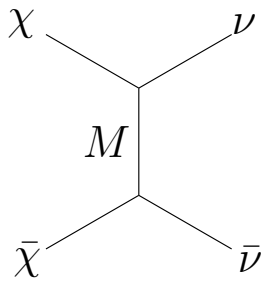


Which simple models of DM can produce an observable flux of monochromatics neutrinos ?

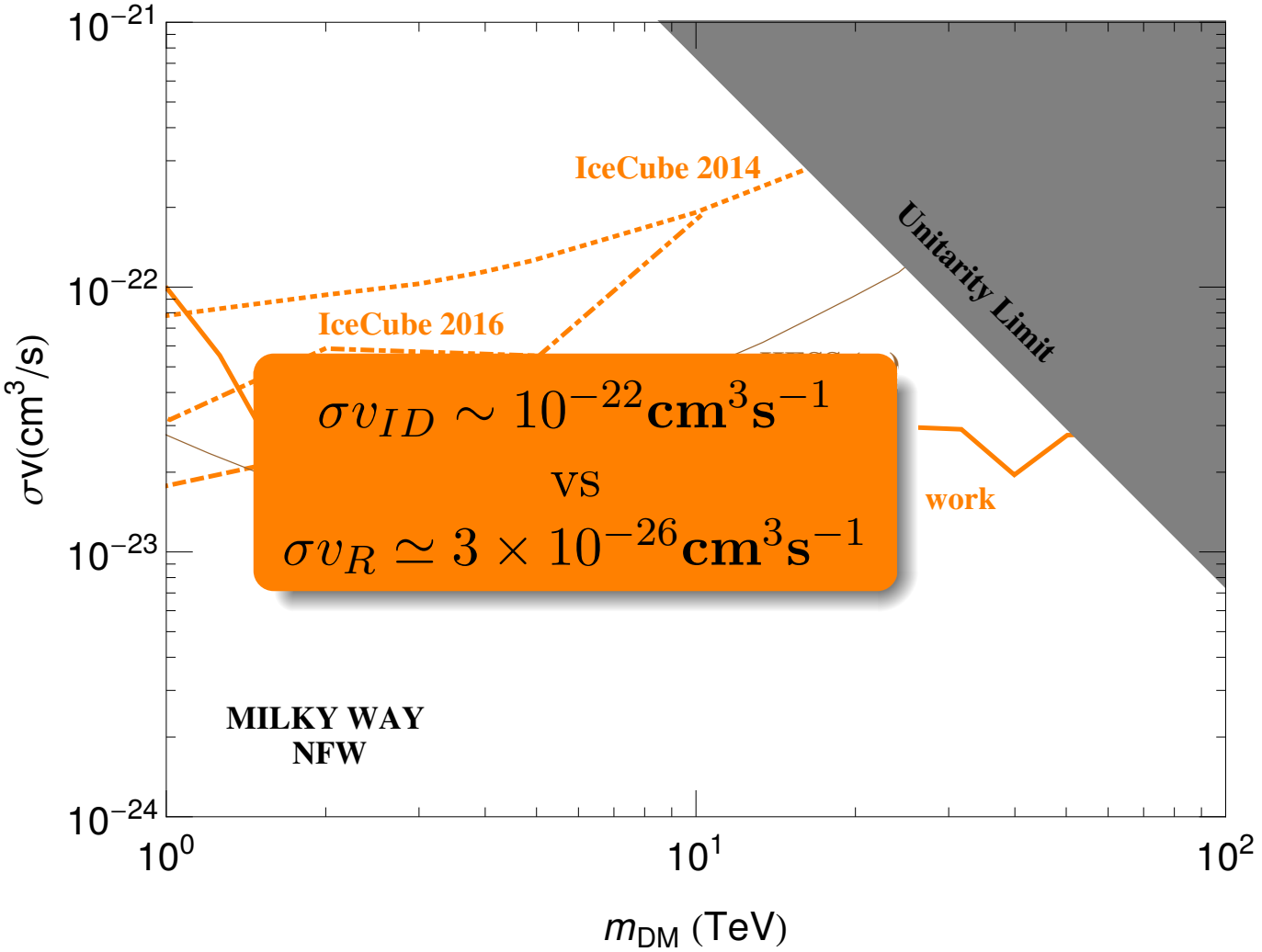
Neutrinos detection : Current status

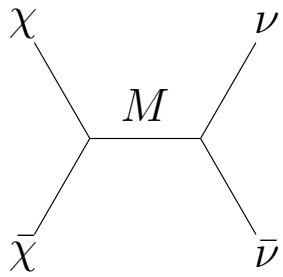


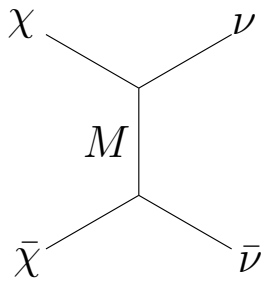




Neutrinos detection : Current status



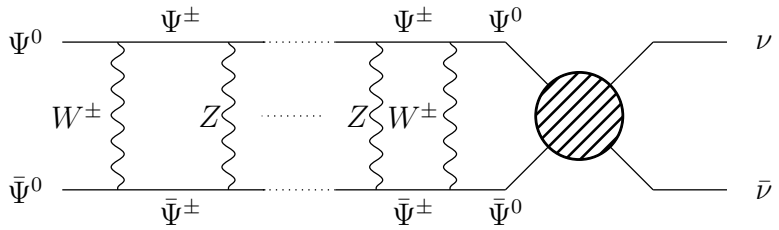




Theoretical framework and setup

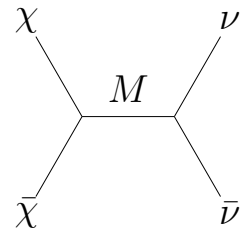
Additional ingredient

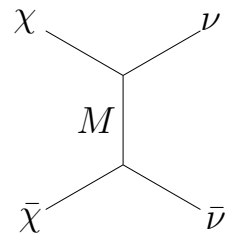
- Sommerfeld effect



Assumptions

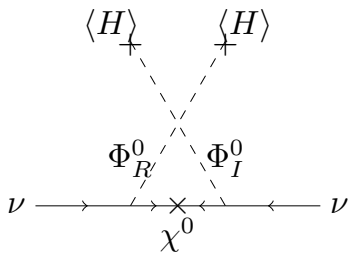
- Scalar or fermionic DM
- Single DM component and one mediator
- Up to a triplet of $SU(2)_L$
- Thermal DM production (freeze-out mechanism)

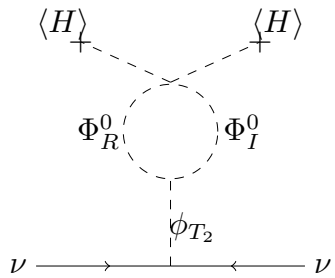




Constraints

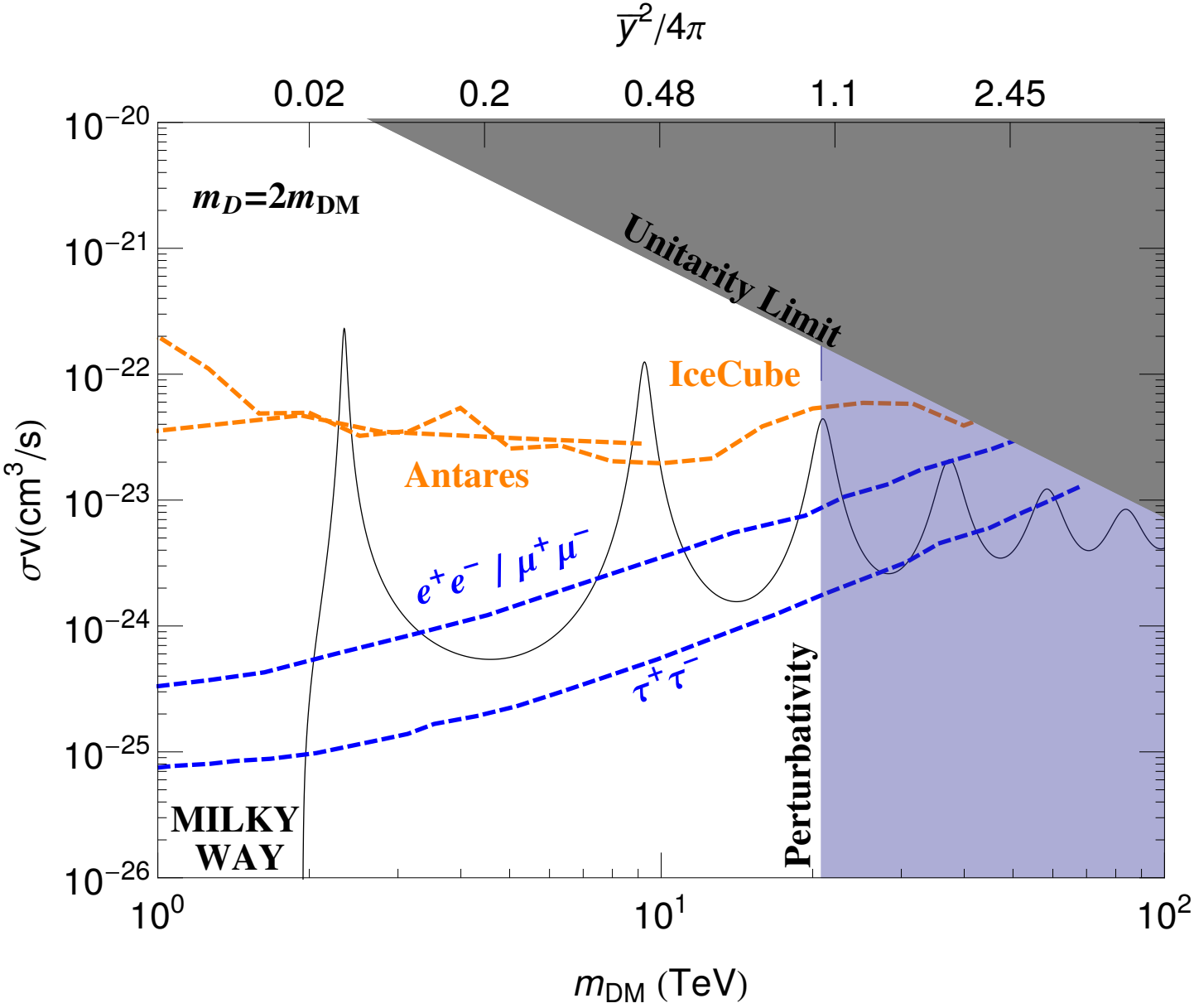
- S-wave annihilation
- Direct detection
- Neutrino masses





Only a few left !

Results



Model :
DM = Dirac triplet
M = Scalar doublet

Conclusion and remarks

- Systematic study of the possibility of observing a **neutrino line** from DM annihilation
- Based on the standard freeze-out mechanism and through the Sommerfeld effect, our findings suggest that neutrino lines **can be observed** in the near future
- Only **few models** are compatible with all criteria and constraints
- In that sense, observation of a neutrino line in TeV scale would be a **smoking gun** for DM annihilation

Thank you !