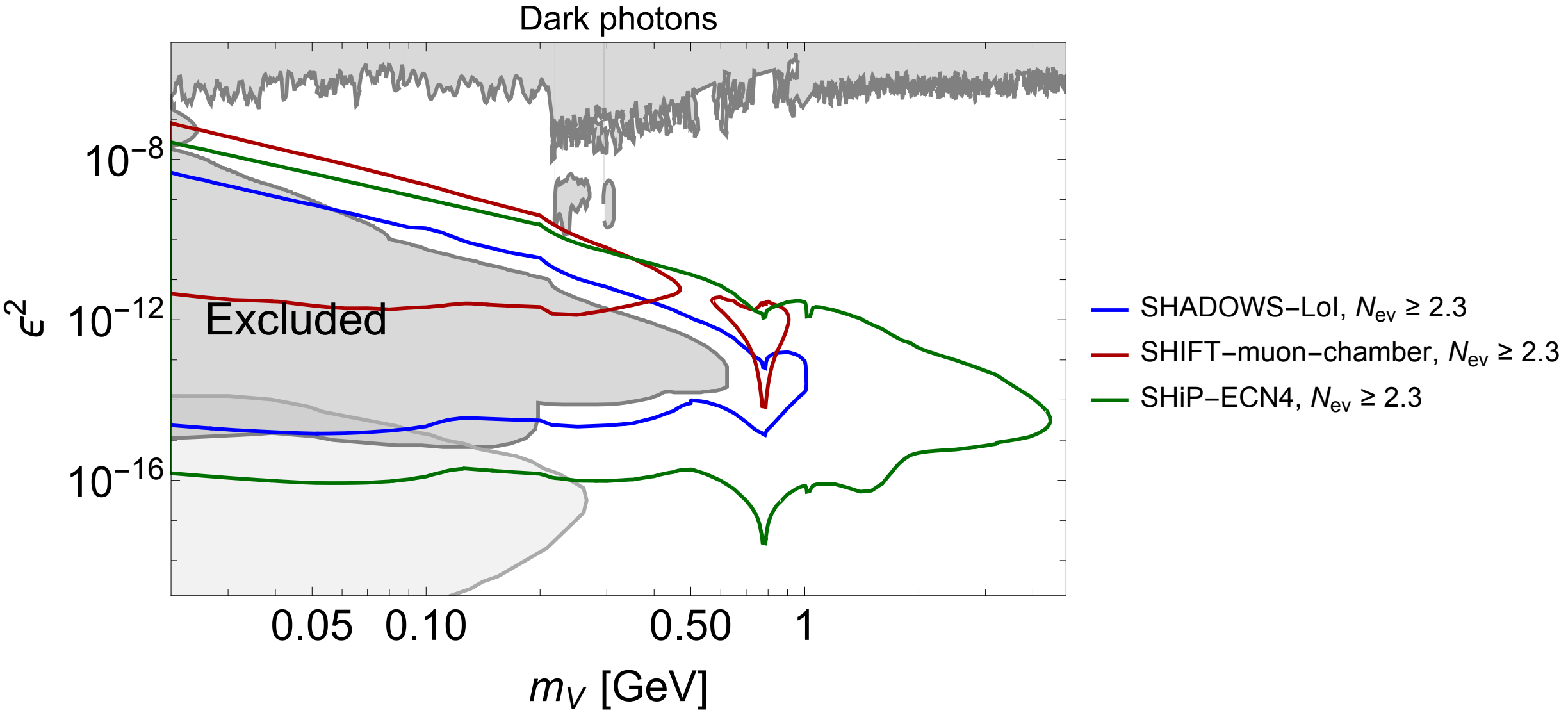
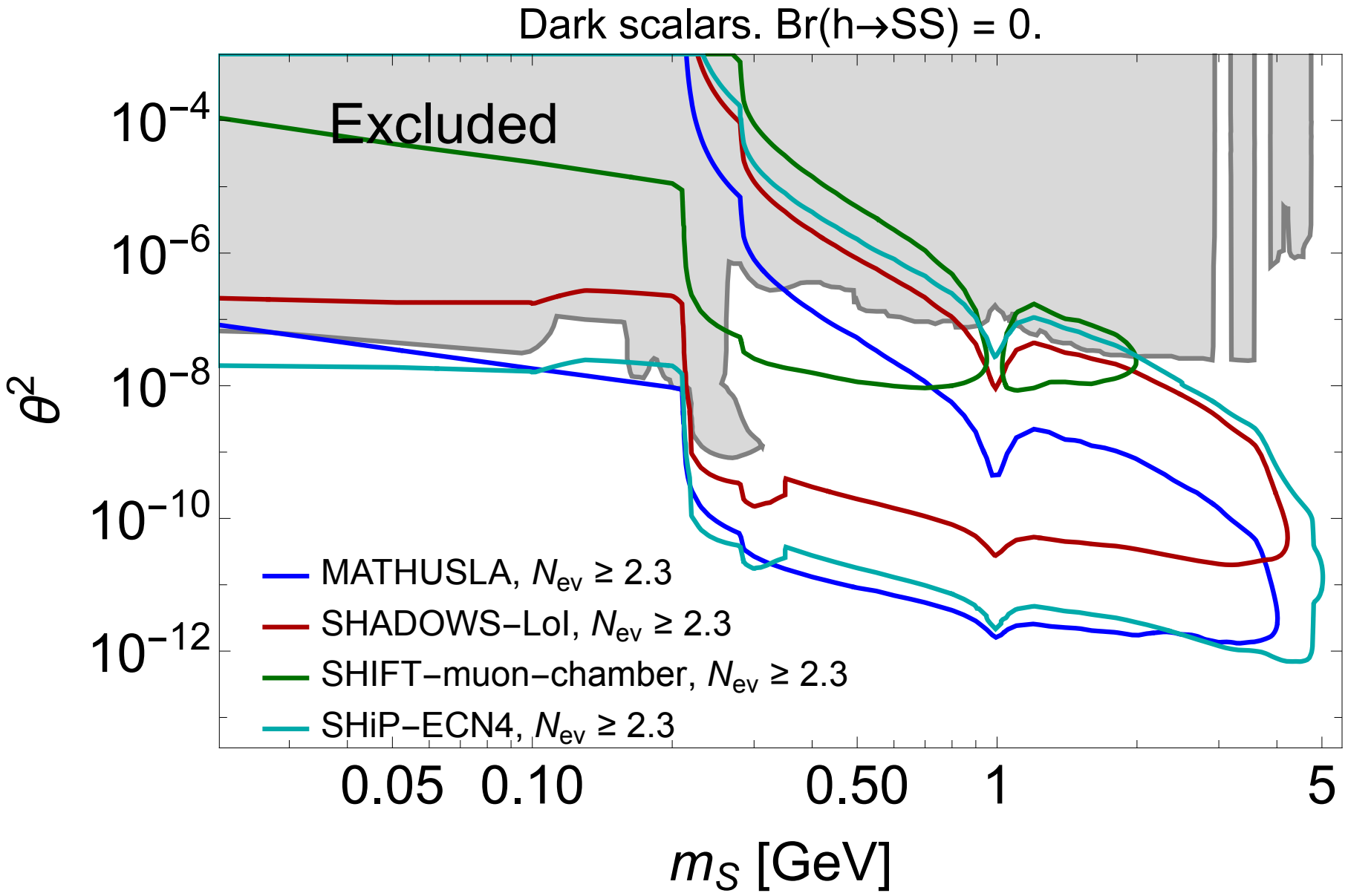
Update from last week:

1. Include **SHIFT in plots** for dark photons and scalars.
2. Made a **PR**.
3. Wrote **documentation on GitHub** with all the parameters and functions implemented for SHIFT.

https://github.com/jniedzie/SensCalc/wiki/SHIFT-implementation


Dark photons
10^{-8}
10^{-12}
10^{-16}
ϵ^2
Excluded
0.05
0.10
0.50
1
m_V [GeV]
SHADOWS−LoI, $N_{ev} \geq 2.3$
SHIFT−muon−chamber, $N_{ev} \geq 2.3$
SHiP−ECN4, $N_{ev} \geq 2.3$

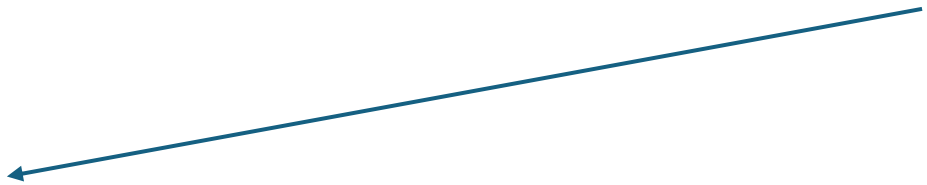

Dark scalars. Br(h→SS) = 0.
Excluded
10^{-4}
10^{-6}
10^{-8}
10^{-10}
10^{-12}
θ^2
MATHUSLA, $N_{ev} \geq 2.3$
SHADOWS−LoI, $N_{ev} \geq 2.3$
SHIFT−muon−chamber, $N_{ev} \geq 2.3$
SHiP−ECN4, $N_{ev} \geq 2.3$
0.05
0.10
0.50
1
5
m_S [GeV]

For this week:

1. **Correct some parameters** (angle grids and decay volumen distances) for a better description of experimental conditions.

2. **Identify other parameters** that could significantly alter the region covered in previous plots.

3. Try to **solve some questions** and list the unsolved ones to ask Maksym.



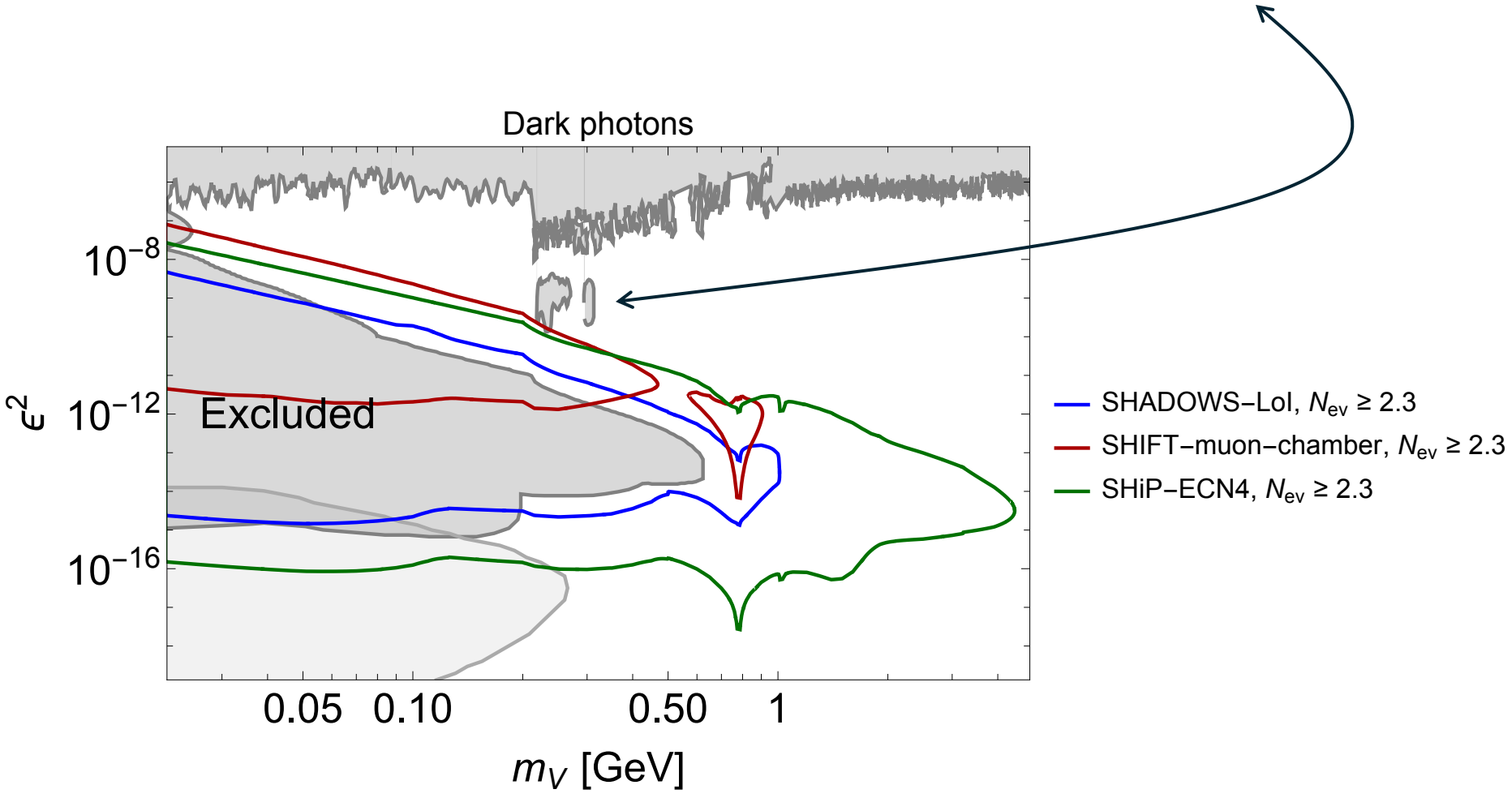
Questions:

- How do they take care about the interactions with the material?

- Why they use decays from K, Kplus for SPS and not for LHC?

Why for bigger coupling constants, the región is uncovered for beam dumps?

-Material (it seems they don't take into account interactions with material)



How can we take into account the particles which get stopped in the material between target and CMS??

The solution is creating two different modes:

- **“SHIFT-muons”**
  - **Full decay volumen**, from target to CMS
  - No need of material parameters implementations (muons can transverse it)
  - Detectable particles: muons

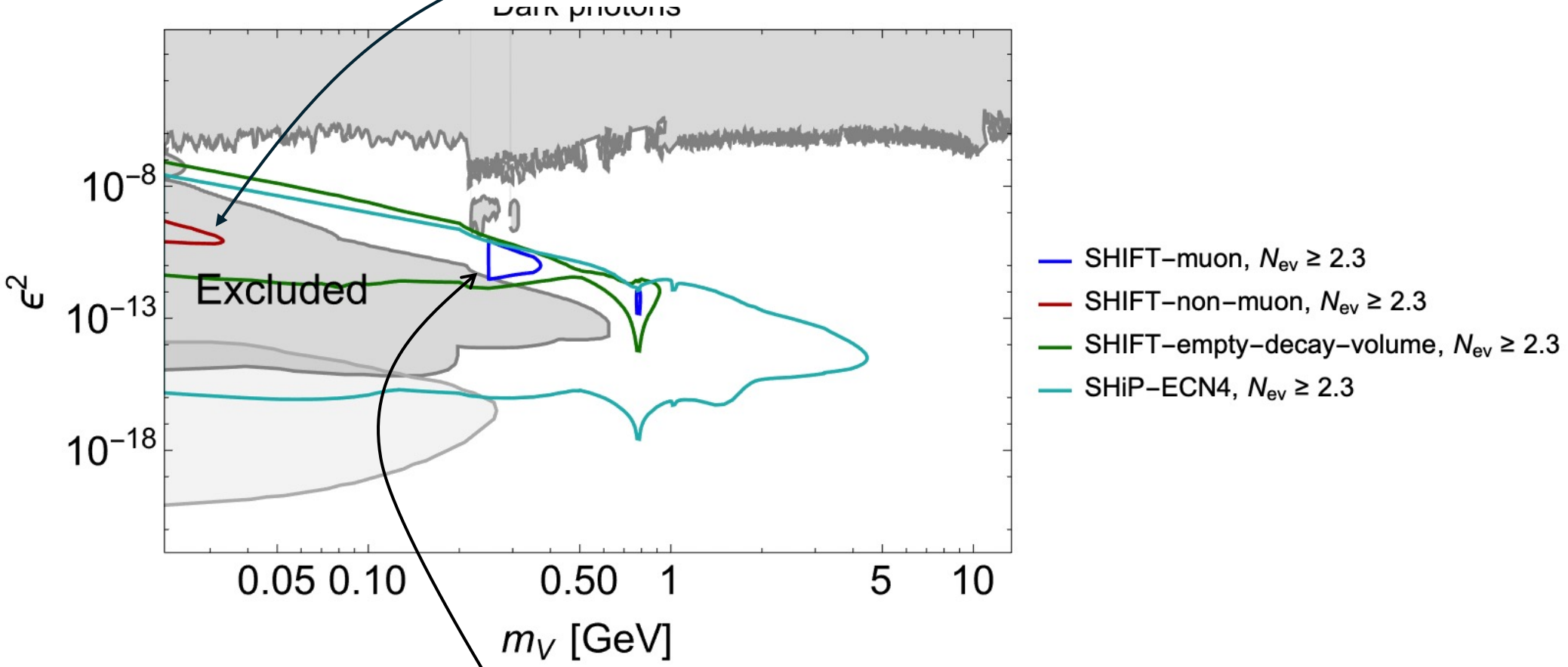
- **“SHIFT-non-muons”** (FASER is defined by this way for all particles)
  - Smaller decay volumen**, 1 m near CMS** (first aproach, we have to figure out the space free of maerial)
  - No need of material parameters implementation (it is free space)
  - Detectable particles: all except muons (which are taken into account in the other mode)

We also added a third mode with the configuration used so far: all particles detectable and full decay volume

PR currently open with these changes

Tried with **dark photons**:

Less decay volumen (1m before CMS)



Limit on the mass of two muons