ASTRO-PARTICLE SECURITY
11:00 AM
A
Our theory of stuff is rich with particles!
Electrons, photons, ...
Imaginatively named the
STANDARD MODEL

B
Some particles make up matter (the protons/neutrons, atoms, us), collectively known as fermions

The rest are bosons and describe how the fermions interact with each other

C
Someone is jealous of this richness... there's been a robbery!
Mostly everything is missing, what we see left is only ~5%
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~5%
The stars in each galaxy orbit TOO FAST... where's the rest of the matter...?
How will we ever find the culprit?
It's completely invisible to light...
WIMP

PRIME SUSPECTS!

AXION

STERILE NEUTRINO
A

WIMP

Heavy invisible particle

Doesn't like to interact with normal matter very often
Axion

- Incredibly lightweight particle
- It hardly interacts with matter
- Ability to convert into other particles
STERILE NEUTRINO

Neither heavy nor light

 Doesn't interact much with anything else

 Hard to detect, like a ghost slipping through walls without leaving a trace
WIMP

PRIME SUSPECTS!

AXION

STERILE NEUTRINO
A  Dark Matter could interact with visible matter
What we search for  What we can see

B  Dark Matter could produce visible matter
What we search for  What we can see

C  Visible matter could produce Dark Matter
What we search for  What we can see

What we search for... particle of interest
What we already know
Dark Matter could interact with visible matter

What we search for

What we can see

DM candidate

What we know
Dark Matter could produce visible matter

What we search for

What we can see

DM candidate

What we know
Visible matter could produce Dark Matter

What we search for

What we can see

DM candidate

What we know