

Syzygy Live Audience Questions

Have we discovered the particle/s that dark matter are made from yet?

No, but we are working on it. There are many ongoing experiments attempting to detect various DM candidates.

¿Is the d-star hexaquark some type of graviton?

No, graviton is a carrier of gravitational force, similar to photon which is a carrier of electro-magnetic force. d* hexaquark is a particle made of six quarks, say if you would take 3 quarks from proton, 3 quarks from neutron and combine them in a very special way you can get a d*.

Are there any real life applications for dark matter?

Depends on DM particles. Some DM candidate, like axions, can hardly be used, others may find some use in real life applications.

How do you measure such a short period of time?

Quantum mechanics forbid us to measure the mass and the lifetime simultaneously with good accuracy. So if we try to measure particle mass we never get mass M, we will always get different numbers: $m_1, m_2, m_3, \dots, m_{1000000}$. By repeating the mass-measuring experiment several times we will get a bell-shape distribution with the maximum of the "bell" being a mass and the width of the "bell" being its lifetime.

Will the D* Hexaquark be added to the Standard Model?

The d* hexaquark is made of the same quarks (uuuddd) as proton (uud) and neutron (udd). These quarks are a part of Standard Model.

Could the D* Hexaquark have applications in Quantum computing (if there was some sort of binding energy reducing decay rate)?

I have no idea. d* Bose-Einstein condensate is expected to be a large system of entangled states. It is not clear for me if one can use it for a quantum computing or not. If yes, it might be very interesting quantum computer, since each qubit in it would have not 2 but 7 possible states.

Can dark matter be a form of exotic matter? One with properties different than most matter?

Yes, it is an exotic form of matter and yes it has very different properties than most of matter – it interacts very weakly and it does not radiate.

Is there any chance of a rocket bumping into dark matter in space

The rocket would not realise it. Dark Matter interact so weakly with anything that it would pass through the rocket without any interaction.

What sorts of telescopes, detector and observations would be needed to find or eliminate the D* Hexaquark?

We might already have data on existence/non-existence of d^* -DM, we just need to reanalyse our data keeping in mind the properties of a new DM candidate. (A telescope, like Fermi-LAT but with better directionality and angular resolution would be helpful)