# Article information:

Inside the Proton, the ‘Most Complicated Thing’ Imaginable | Quanta Magazine
<https://www.quantamagazine.org/inside-the-proton-the-most-complicated-thing-imaginable-20221019/>

# Article summary:

1. The proton, a positively charged particle at the heart of every atom, is an object of unspeakable complexity that changes its appearance depending on how it is probed.

2. Recent data analysis has found that the proton contains traces of particles called charm quarks that are heavier than the proton itself, which could have implications for understanding high-energy collisions and cosmic rays.

3. Next-generation experiments, such as the Electron-Ion Collider, will seek to take higher-resolution snapshots and create detailed maps of the spins of internal quarks and gluons to finally pin down the origin of the proton's spin and address other fundamental questions about this baffling particle.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The Quanta Magazine article "Inside the Proton, the ‘Most Complicated Thing’ Imaginable" provides a detailed overview of the proton's complexity and the ongoing efforts to understand it. The article is well-researched and provides insights from multiple physicists in the field. However, there are some potential biases and missing points of consideration that should be noted.

One potential bias is that the article focuses primarily on experimental evidence and does not delve deeply into theoretical models of the proton. While experimental evidence is crucial for understanding the proton, theoretical models also play an important role in guiding research and interpreting results. Additionally, while the article notes that QCD has limitations in understanding three-quark systems like the proton, it does not explore alternative theories or approaches to understanding these systems.

The article also presents some claims without providing sufficient evidence or exploring counterarguments. For example, it states that charm quarks appearing at certain moments could shower Earth with extra-energetic neutrinos but does not provide evidence for this claim or explore potential counterarguments. Similarly, it notes that higher-energy colliders offer a sharper view of the proton but does not explain why this is the case or explore potential limitations of high-energy colliders.

There are also some missing points of consideration in the article. For example, while it notes that researchers need to know what's in a proton to understand results from particle collisions at high-energy colliders like the Large Hadron Collider, it does not explore how this knowledge could be used to develop new theories or models of particle physics.

Overall, while "Inside the Proton" provides a comprehensive overview of current research on the proton, there are some potential biases and missing points of consideration that should be noted.

# Topics for further research:

* Theoretical models of the proton in particle physics
* Alternative theories to QCD for understanding three-quark systems
* Evidence for charm quarks showering Earth with extra-energetic neutrinos
* Limitations of high-energy colliders for studying the proton
* Using knowledge of the proton to develop new theories of particle physics
* The role of computational modeling in understanding the proton's complexity

# Report location:

<https://www.fullpicture.app/item/cd625ae4aa6a9a344cafaed95f02c703>