Is modern cosmology based on virtual entities?

The case of dark matter

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The case of dark matter

- References to dark matter from the beginning of the 20th century. Without distinguishing it from ordinary material (faint stars, cold stars,…). Today, it is not attributed the same nature. We refer to the same entity but its meaning is **evolving**.

- In the 20th century, dark matter as an **auxiliary hypothesis** = hypothesis added a posteriori to match theory and observation. $m_{theoretical} > m_{visible} \longrightarrow m_{theoretical} = m_{visible} + m_{invisible}$.

- Today, dark matter is a fundamental element of astrophysics ⟶ the same amount of invisible mass is present in all our models (galactic, intergalactic, cosmological) ⟶ it allows **epistemic coherence**.

- It is visually unobservable. But there are other observational accesses based on **independent theories**: Newton's gravitational theory (galaxy), equivalence between potential and kinetic energy (galactic cluster), understanding of the gravitational lens effect, etc. Observations (with independent theory-laden) access the effects of dark matter. Unbelievable that they independently produce the same error, in the same amount.

- **Virtual entity**: of unknown nature and refers to unidentified substances but produces observable phenomena and therefore **refers to a reality**.

- Transition from virtual ontology to a "primary" ontology: **access it in all its forms** (all its properties) ⟶ characterize it ⟶ give a complex definition close to reality.

- **Continuous** evolution of the ontological status.

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Scientific ontology

- **Continuously** tends to get closer to reality

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