Dark Matter circle feedback

GECO day, september 14th 2017

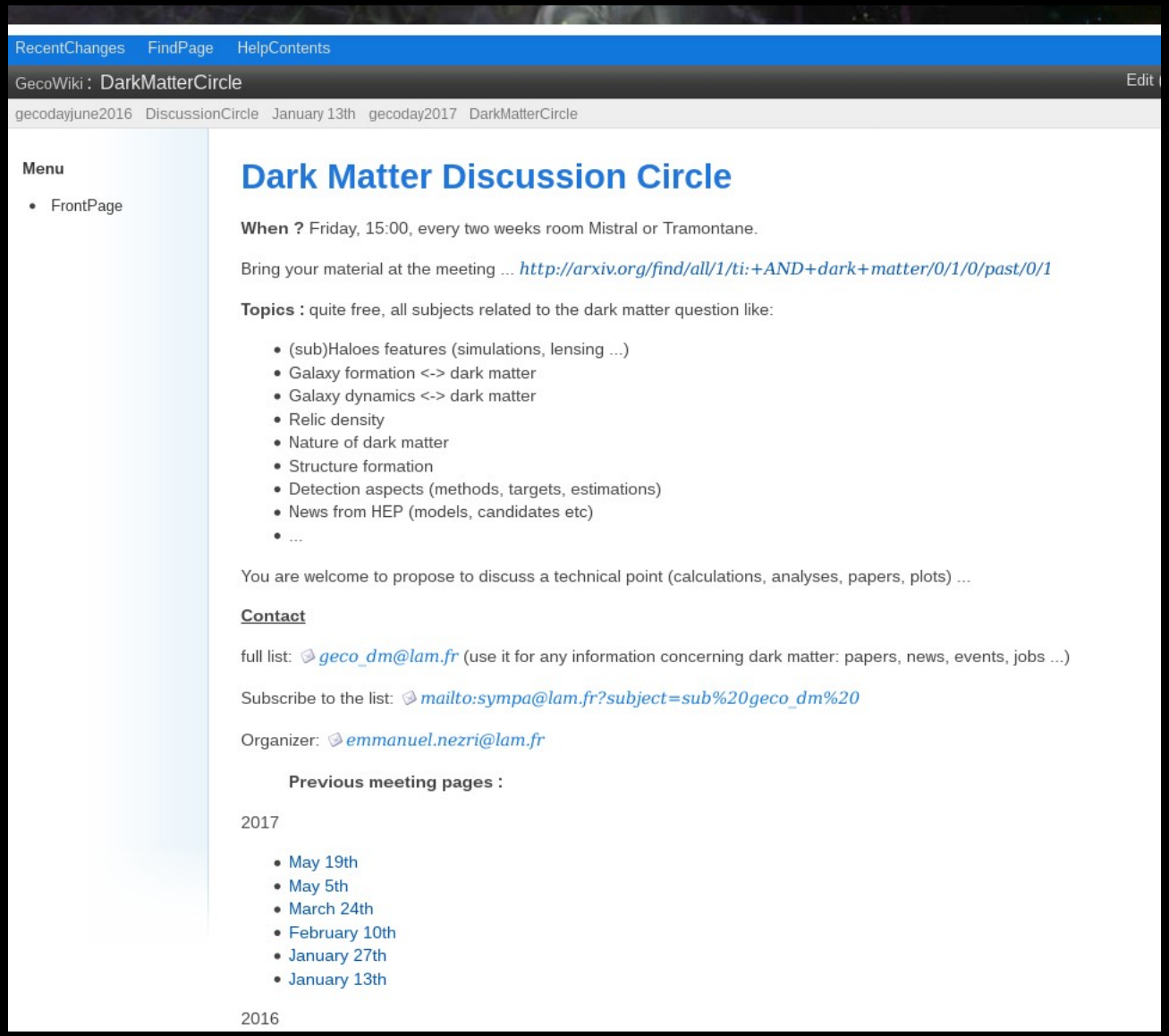

DARK
MATTER


DARK
MATTER
SEASON TWO


DARK MATTER
SEASON 2


https://www.youtube.com/watch?v=WtMYq0VRQIU
SEASON 2 RECAP

https://wiki.lam.fr/geco/DarkMatterCircle



RecentChanges FindPage HelpContents

GecoWiki : DarkMatterCircle Edit

gecodayjune2016 DiscussionCircle January 13th gecoday2017 DarkMatterCircle

Menu

- FrontPage

Dark Matter Discussion Circle

When ? Friday, 15:00, every two weeks room Mistral or Tramontane.

Bring your material at the meeting ... *http://arxiv.org/find/all/1/ti:+AND+dark+matter/0/1/0/past/0/1*

Topics : quite free, all subjects related to the dark matter question like:

- (sub)Haloes features (simulations, lensing ...)
- Galaxy formation <-> dark matter
- Galaxy dynamics <-> dark matter
- Relic density
- Nature of dark matter
- Structure formation
- Detection aspects (methods, targets, estimations)
- News from HEP (models, candidates etc)
- ...

You are welcome to propose to discuss a technical point (calculations, analyses, papers, plots) ...

Contact

full list: *geco_dm@lam.fr* (use it for any information concerning dark matter: papers, news, events, jobs ...)

Subscribe to the list: *mailto:sympa@lam.fr?subject=sub%20geco_dm%20*

Organizer: *emmanuel.nezri@lam.fr*

Previous meeting pages :

2017

- May 19th
- May 5th
- March 24th
- February 10th
- January 27th
- January 13th

2016

19 subscribers to the list

~8-10 participants
to the meetings

Open discussion
on astro-ph papers

Round table

Tackled topics :

- Dark matter distribution features :
(sub)Halo profile at all scales, halo shape, cusp/core, Dark disk, dynamics ...

- DM nature : CDM, SIDM, FuzzyDM, WDM …

- HEP candidates : SUSY neutralino, KK DM, WIMPs, axions, sterile neutrinos ...

- DM detection : direct, indirect (gamma,neutrinos,cosmic rays)

Missing : Not enough discussions on very large scales : simulations versus surveys, filaments-(dark)cosmic web, global abundance (cosmo point of view)

Minutes of the meetings on the circle web page : a short summary/comment of each discussed paper

The structure and assembly history of cluster-size haloes in Self-Interacting Dark Matter

Thejs Brinckmann[1,2⋆], Jesús Zavala[3,2†], David Rapetti[4,5,2], Steen H. Hansen[2], & Mark Vogelsberger[6]

[1] *Institute for Theoretical Particle Physics and Cosmology (TTK), RWTH Aachen University, D-52056 Aachen, Germany*
[2] *Dark Cosmology Centre, Niels Bohr Institute, University of Copenhagen, Juliane Maries Vej 30, 2100 Copenhagen, Denmark*
[3] *Center for Astrophysics and Cosmology, Science Institute, University of Iceland, Dunhagi 5, 107 Reykjavik, Iceland*
[4] *Center for Astrophysics and Space Astronomy, Department of Astrophysical and Planetary Science, University of Colorado, Boulder, C0 80309, USA*
[5] *NASA Ames Research Center, Moffett Field, CA 94035, USA*
[6] *Department of Physics, Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology, 77 Massachusetts Avenue, Cambridge, MA 02139, US*

3 May 2017

ABSTRACT

We perform dark-matter-only simulations of a sample of 28 relaxed massive cluster-sized haloes in the Cold Dark Matter (CDM) and Self-Interacting Dark Matter (SIDM) models of structure formation, in order to study the structural differences across the models at large radii, in a regime that has been largely unexplored, and where the impact of baryonic physics is expected to be very limited. We find that the sample distributions for the radial profiles of the density, ellipsoidal axis ratios (halo shapes), and velocity anisotropies (β) of the haloes differ considerably between the models, even at $\gtrsim 10\%$ of the virial radius, if the amplitude of the self-scattering cross section is $\sigma/m_\chi = 1$ cm^2 gr^{-1}. For the density profiles and halo shapes, the separation is around the 1σ level, with the halo shapes showing the strongest deviations, whereas for β we find a narrower distribution in SIDM by $\sim 25\%$. This distribution is skewed towards isotropic orbits with no haloes in our SIDM sample having $\beta > 0.2$ at 15% of the virial radius, as opposed to 25% of the haloes for CDM. We estimate that an observational sample of ~ 60 relaxed clusters of mass $\sim 10^{15}$ M$_\odot$ would be needed to use β as a diagnostic to put competitive constraints on SIDM. We also study the extent to which the memory of the assembly history of haloes is erased in SIDM clusters. For $\sigma/m_\chi = 1$ cm^2 gr^{-1}, we find that this memory is erased only in the very central regions of the halo ($\sim 1/4$ of the scale radius of the halo), and only for haloes that assembled their mass within this region earlier than a formation redshift $z_f \sim 2$. When these conditions are not satisfied, the memory of assembly remains in SIDM and is reflected in similar ways, albeit with weaker trends, as it is in CDM.

Key words: cosmology: theory – cosmology: dark matter – galaxies: clusters: general – methods: numerical

1 INTRODUCTION

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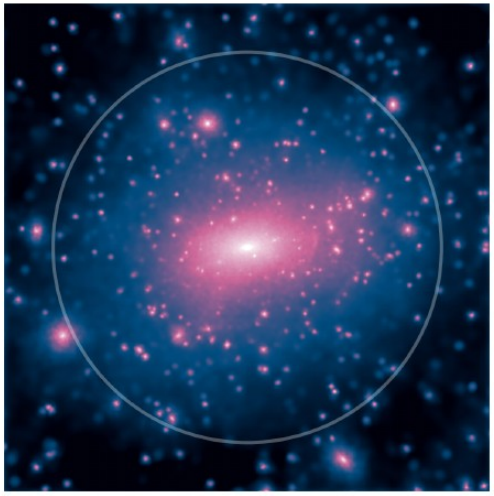

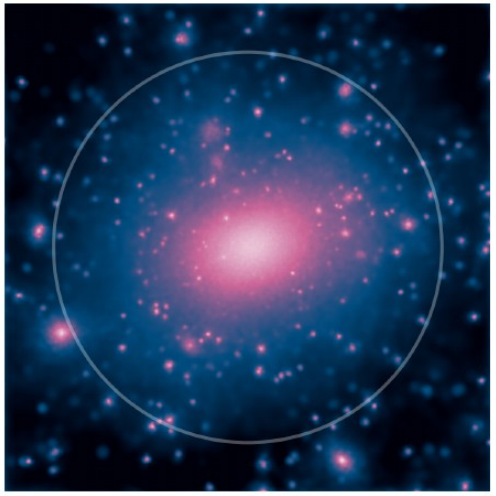

Figure 1. The most massive halo in our sample ($M_{200} \sim 2 \times 10^{15}$ $M_\odot$ h^{-1}) in the CDM (left) and SIDM1 (right) cases. The c marks the virial radius of the halo ($R_{200} \sim 2$ Mpc h^{-1}).

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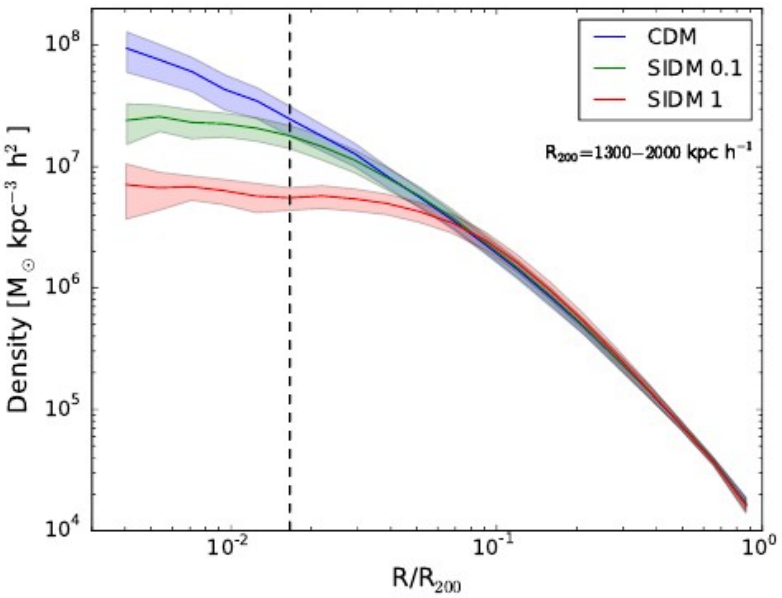

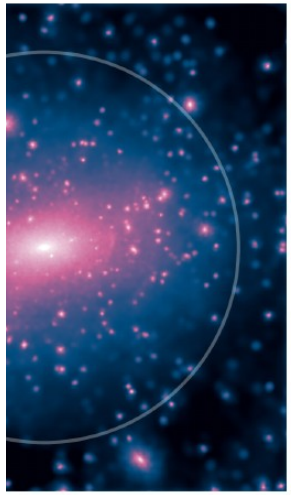

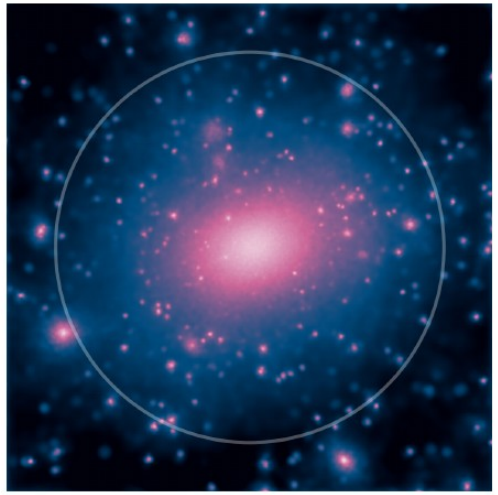

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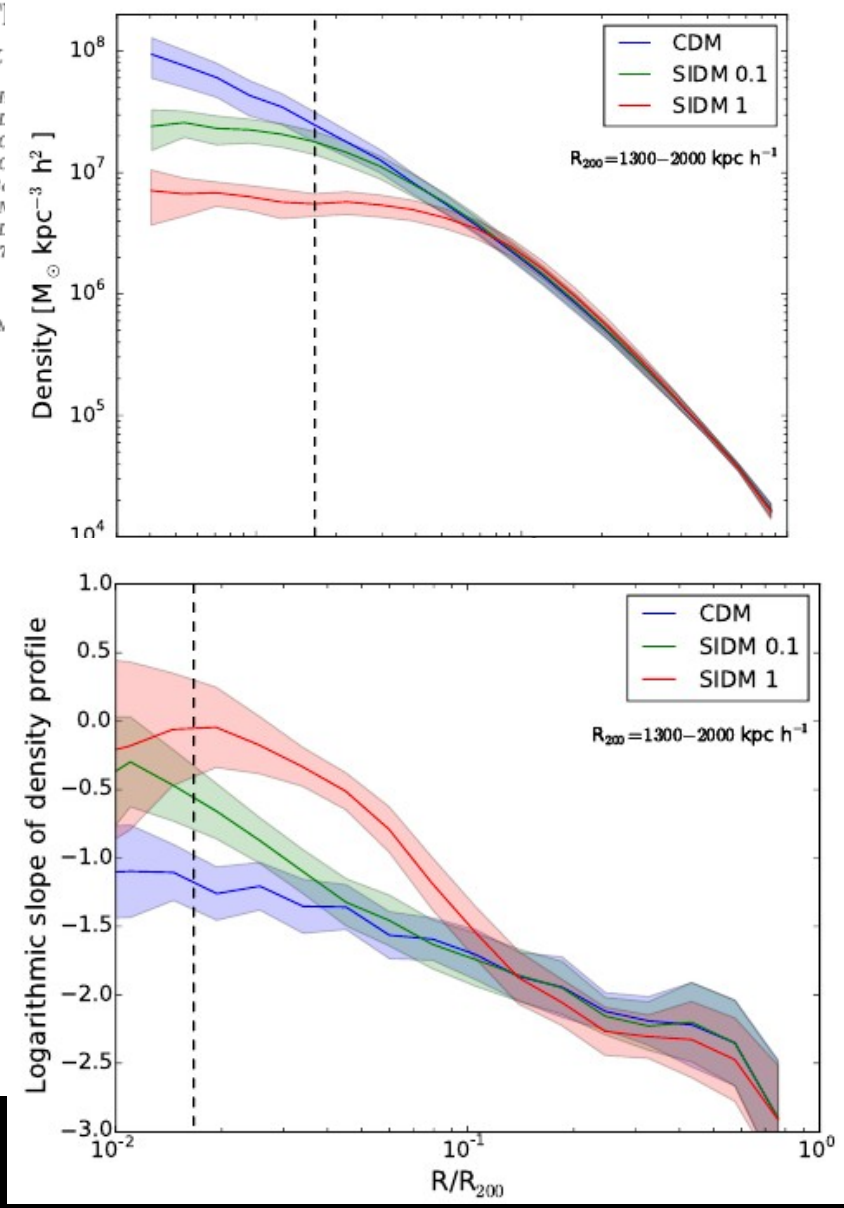

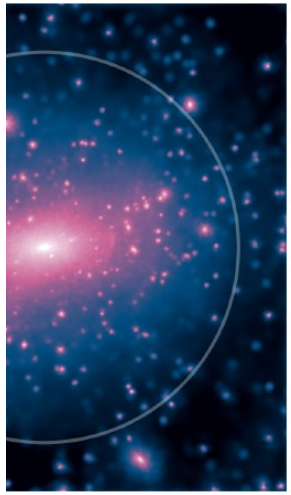

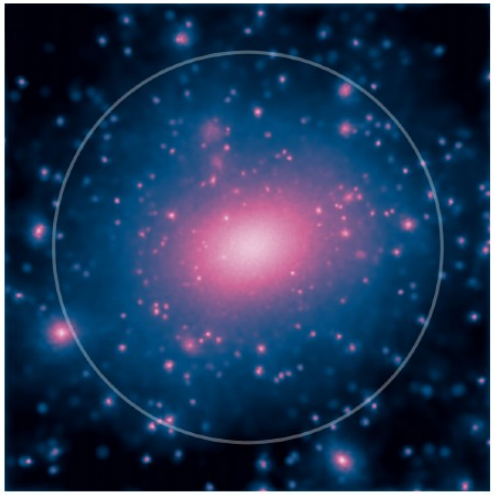

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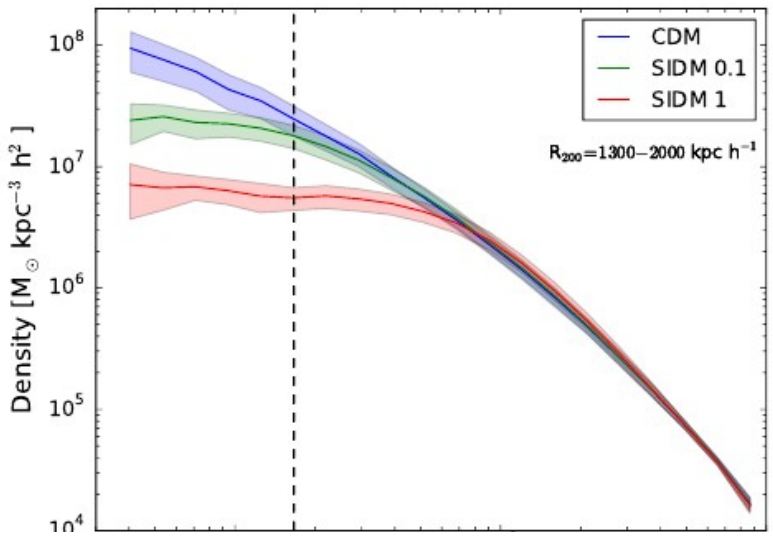

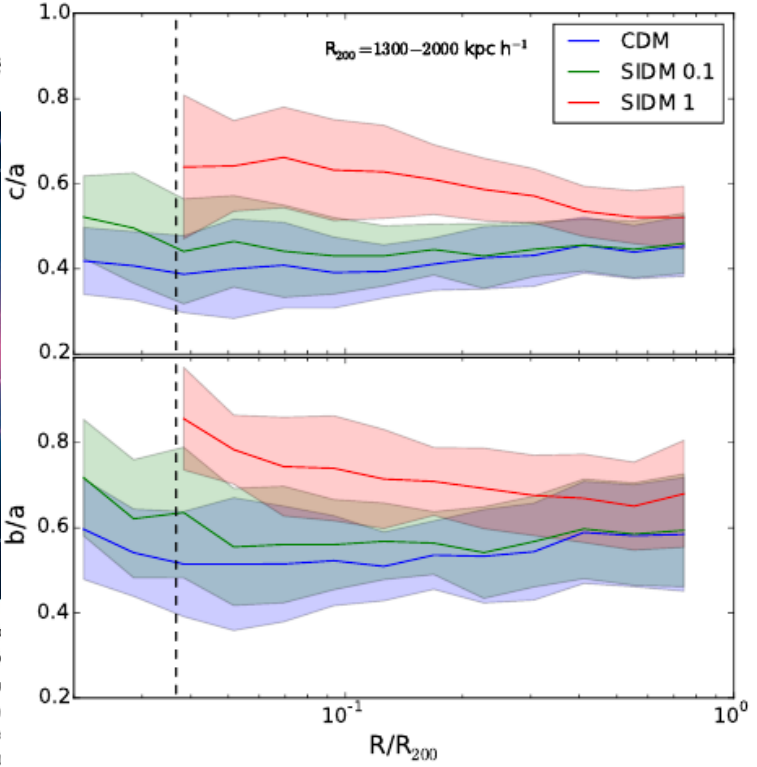

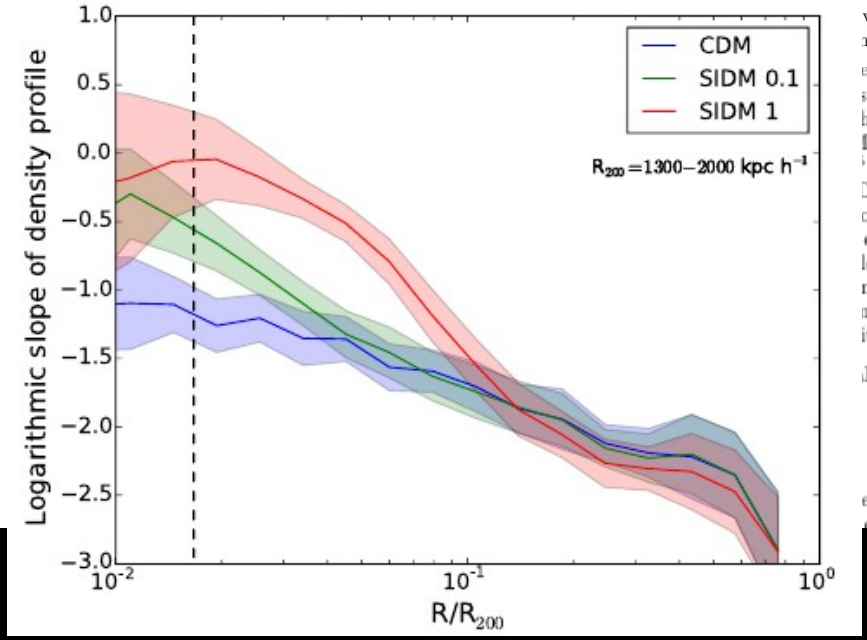

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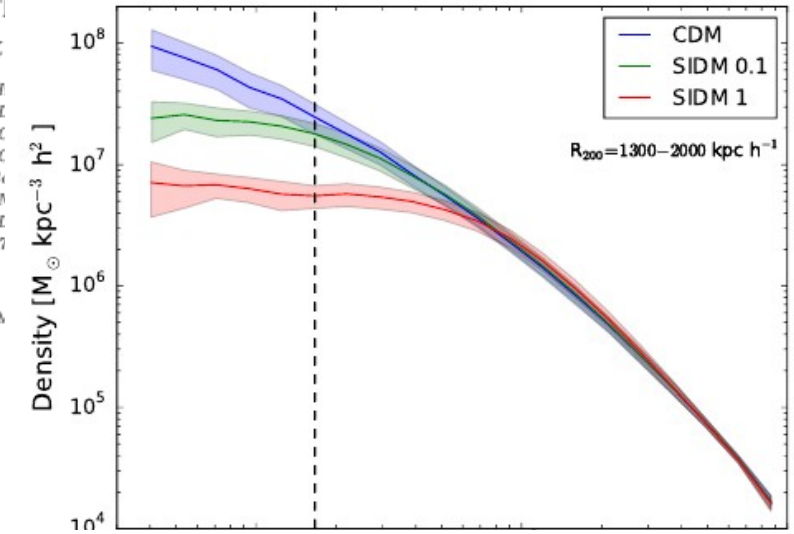

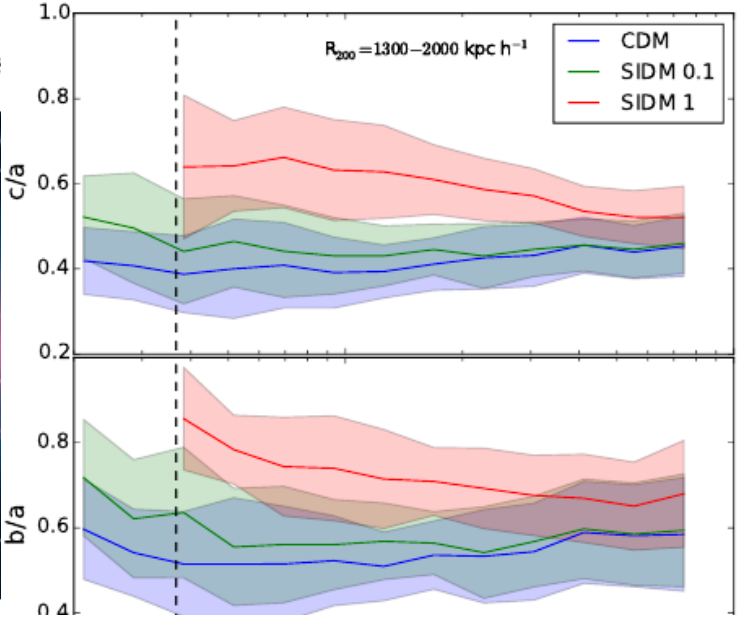

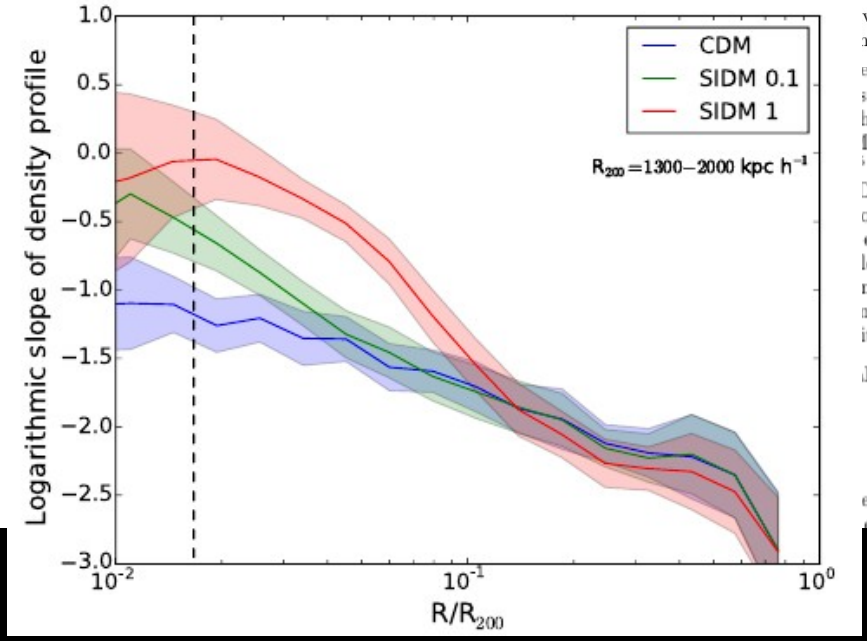

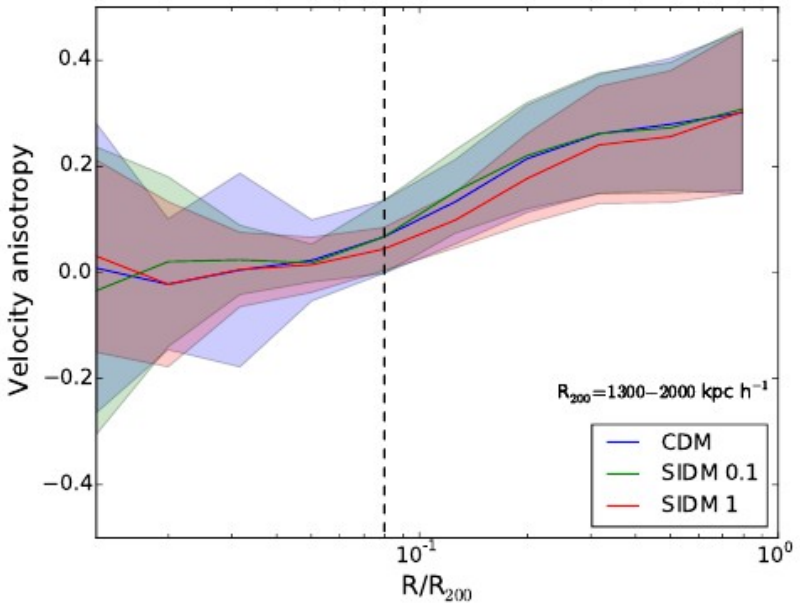

January 27th : One month after Vera Rubin passed away

Discussion on which works on rotation curves really induce dark matter
in the outskirt of galaxies

- Albert view: https://www.youtube.com/watch?v=FjGJwJ-oMbo&t=828s,
  arguing that Vera Rubin data have no impact on the outskirt RCs.

- Other recent historical (re)views on dark matter:
  http://arxiv.org/abs/1605.04909, http://arxiv.org/abs/arXiv:1701.05837

- see also
https://blogs.scientificamerican.com/guest-blog/vera-rubins-contributions-to-astronomy/

In memory of Vera Rubin at least for her support to galaxy rotation curve studies.

"Render unto Caesar ...", difficult task.

First Dark Matter Search Results from the XENON1T Experiment

E. Aprile,[1] J. Aalbers,[2,*] F. Agostini,[3,4] M. Alfonsi,[5] F. D. Amaro,[6] M. Anthony,[1] F. Arneodo,[7] P. Barrow,[8] L. Baudis,[8] B. Bauermeister,[9] M. L. Benabderrahmane,[7] T. Berger,[10] P. A. Breur,[2] A. Brown,[2] A. Brown,[8] E. Brown,[10] S. Bruenner,[11] G. Bruno,[3] R. Budnik,[12] L. Bütikofer,[13,†] J. Calvén,[9] J. M. R. Cardoso,[6] M. Cervantes,[14] D. Cichon,[11] D. Coderre,[13] A. P. Colijn,[2] J. Conrad,[9,‡] J. P. Cussonneau,[15] M. P. Decowski,[2] P. de Perio,[1] P. Di Gangi,[4] A. Di Giovanni,[7] S. Diglio,[15] G. Eurin,[11] J. Fei,[16] A. D. Ferella,[9] A. Fieguth,[17] W. Fulgione,[3,18] A. Gallo Rosso,[3] M. Galloway,[8] F. Gao,[1] M. Garbini,[4] R. Gardner,[19] C. Geis,[5] L. W. Goetzke,[1] L. Grandi,[19] Z. Greene,[1] C. Grignon,[5] C. Hasterok,[11] E. Hogenbirk,[2] J. Howlett,[1] R. Itay,[12] B. Kaminsky,[13,†] S. Kazama,[8] G. Kessler,[8] A. Kish,[8] H. Landsman,[12] R. F. Lang,[14] D. Lellouch,[12] L. Levinson,[12] Q. Lin,[1] S. Lindemann,[11,13] M. Lindner,[11] F. Lombardi,[16] J. A. M. Lopes,[6,§] A. Manfredini,[12] I. Mariş,[7] T. Marrodán Undagoitia,[11] J. Masbou,[15] F. V. Massoli,[4] D. Masson,[14] D. Mayani,[8] M. Messina,[1] K. Micheneau,[15] A. Molinario,[3] K. Morå,[9] M. Murra,[17] J. Naganoma,[20] K. Ni,[16] U. Oberlack,[5] P. Pakarha,[8] B. Pelssers,[9] R. Persiani,[15] F. Piastra,[8] J. Pienaar,[14] V. Pizzella,[11] M.-C. Piro,[10] G. Plante,[1,¶] N. Priel,[12] L. Rauch,[11] S. Reichard,[8,14] C. Reuter,[14] B. Riedel,[19] A. Rizzo,[1] S. Rosendahl,[17] N. Rupp,[11] R. Saldanha,[19] J. M. F. dos Santos,[6] G. Sartorelli,[4] M. Scheibelhut,[5] S. Schindler,[5] J. Schreiner,[11] M. Schumann,[13] L. Scotto Lavina,[21] M. Selvi,[4] P. Shagin,[20] E. Shockley,[19] M. Silva,[6] H. Simgen,[11] M. v. Sivers,[13,†] A. Stein,[22] S. Thapa,[19] D. Thers,[15] A. Tiseni,[2] G. Trinchero,[18] C. Tunnell,[19,**] M. Vargas,[17] N. Upole,[19] H. Wang,[22] Z. Wang,[3] Y. Wei,[8] C. Weinheimer,[17] J. Wulf,[8] J. Ye,[16] Y. Zhang,[1] and T. Zhu[1]

(XENON Collaboration)[,††]

[1] *Physics Department, Columbia University, New York, NY 10027, USA*
[2] *Nikhef and the University of Amsterdam, Science Park, 1098XG Amsterdam, Netherlands*
[3] *INFN-Laboratori Nazionali del Gran Sasso and Gran Sasso Science Institute, 67100 L'Aquila, Italy*
[4] *Department of Physics and Astrophysics, University of Bologna and INFN-Bologna, 40126 Bologna, Italy*
[5] *Institut für Physik & Exzellenzcluster PRISMA, Johannes Gutenberg-Universität Mainz, 55099 Mainz, Germany*
[6] *LIBPhys, Department of Physics, University of Coimbra, 3004-516 Coimbra, Portugal*
[7] *New York University Abu Dhabi, Abu Dhabi, United Arab Emirates*
[8] *Physik-Institut, University of Zurich, 8057 Zurich, Switzerland*
[9] *Oskar Klein Centre, Department of Physics, Stockholm University, AlbaNova, Stockholm SE-10691, Sweden*
[10] *Department of Physics, Applied Physics and Astronomy, Rensselaer Polytechnic Institute, Troy, NY 12180, USA*
[11] *Max-Planck-Institut für Kernphysik, 69117 Heidelberg, Germany*
[12] *Department of Particle Physics and Astrophysics, Weizmann Institute of Science, Rehovot 7610001, Israel*
[13] *Physikalisches Institut, Universität Freiburg, 79104 Freiburg, Germany*
[14] *Department of Physics and Astronomy, Purdue University, West Lafayette, IN 47907, USA*
[15] *SUBATECH, IMT Atlantique, CNRS/IN2P3, Université de Nantes, Nantes 44307, France*
[16] *Department of Physics, University of California, San Diego, CA 92093, USA*
[17] *Institut für Kernphysik, Westfälische Wilhelms-Universität Münster, 48149 Münster, Germany*
[18] *INFN-Torino and Osservatorio Astrofisico di Torino, 10125 Torino, Italy*
[19] *Department of Physics & Kavli Institute for Cosmological Physics, University of Chicago, Chicago, IL 60637, USA*
[20] *Department of Physics and Astronomy, Rice University, Houston, TX 77005, USA*
[21] *LPNHE, Université Pierre et Marie Curie, Université Paris Diderot, CNRS/IN2P3, Paris 75252, France*
[22] *Physics & Astronomy Department, University of California, Los Angeles, CA 90095, USA*

(Dated: May 24, 2017)

We report the first dark matter search results from XENON1T, a ∼2000-kg-target-mass dual-phase (liquid-gas) xenon time projection chamber in operation at the Laboratori Nazionali del Gran Sasso in Italy and the first ton-scale detector of this kind. The blinded search used 34.2 live days

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(XENON Coll

[1] *Physics Department, Columbia Uni*
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(Dated: May 24, 2017)

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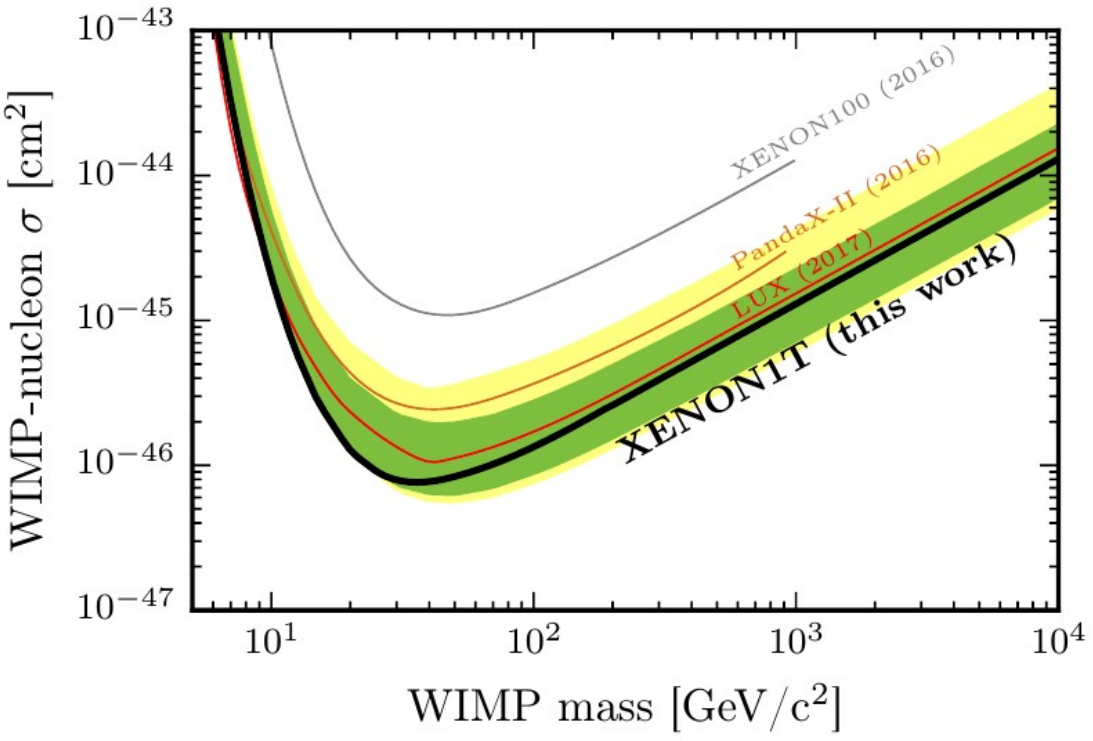
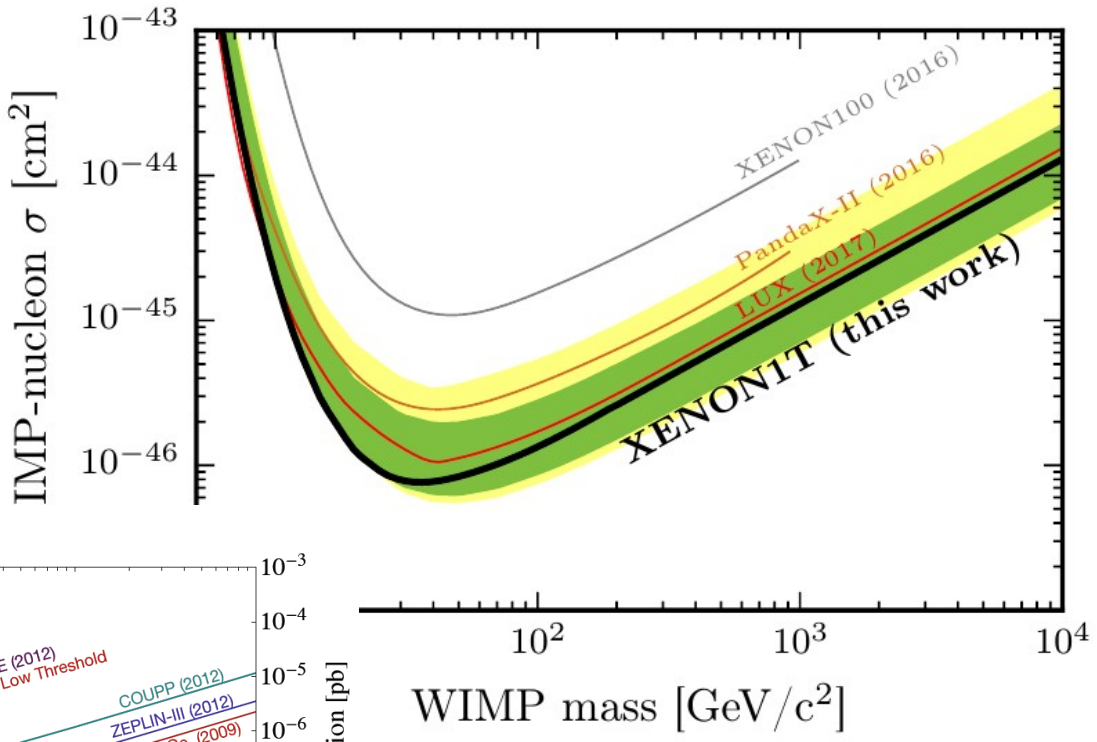


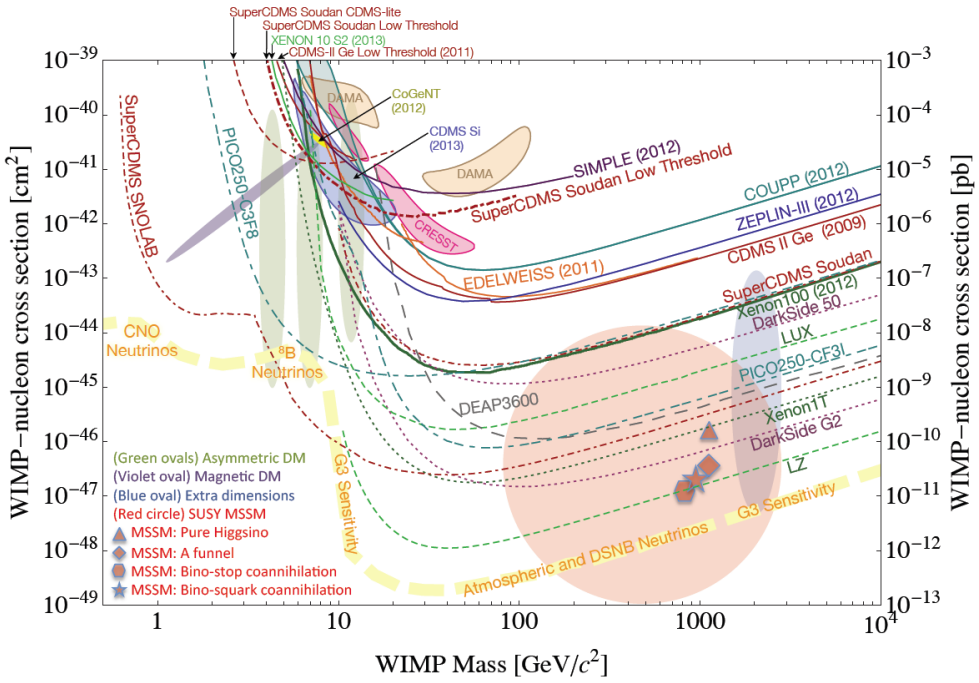
Sub zepto barn era !

First Dark Matter Search Results from the XENON1T Experiment

E. Aprile,[1] J. Aalbers,[2,*] F. Agostini,[3,4] M. Alfonsi,[5] F. D. Amaro,[6] M. Anthony,[1] F. Arneodo,[7] P. Barrow,[8] L. Baudis,[8] B. Bauermeister,[9] M. L. Benabderrahmane,[7] T. Berger,[10] P. A. Breur,[2] A. Brown,[2] A. Brown,[8] E. Brown,[10] S. Bruenner,[11] G. Bruno,[3] R. Budnik,[1] M. Cervantes,[14] D. Cichon,[11] D. Coderre,[13] A. P. Colijn,[2] P. de Perio,[1] P. Di Gangi,[4] A. Di Giovanni,[7] S. Diglio, W. Fulgione,[3,18] A. Gallo Rosso,[3] M. Galloway,[8] L. W. Goetzke,[1] L. Grandi,[19] Z. Greene,[1] C. Grignon,[5] B. Kaminsky,[13,†] S. Kazama,[8] G. Kessler,[8] A. Kis, L. Levinson,[12] Q. Lin,[1] S. Lindemann,[11,13] M. Lindner, I. Mariş,[7] T. Marrodán Undagoitia,[11] J. Masbou,[15] F. K. Micheneau,[15] A. Molinario,[3] K. Morå,[9] M. Murra,[1] B. Pelssers,[9] R. Persiani,[15] F. Piastra,[8] J. Piena, N. Priel,[12] L. Rauch,[11] S. Reichard,[8,14] C. Reuter,[14] R. Saldanha,[19] J. M. F. dos Santos,[6] G. Sartorelli, M. Schumann,[13] L. Scotto Lavina,[21] M. Selvi,[4] P. M. v. Sivers,[13,†] A. Stein,[22] S. Thapa,[19] D. Thers,[15] A. N. Upole,[19] H. Wang,[22] Z. Wang,[3] Y. Wei,[8] C. Weinl, (XENON Coll

[1] *Physics Department, Columbia Uni*





Sub zepto barn era !

Dark matter circle

Future : Season 3 ?

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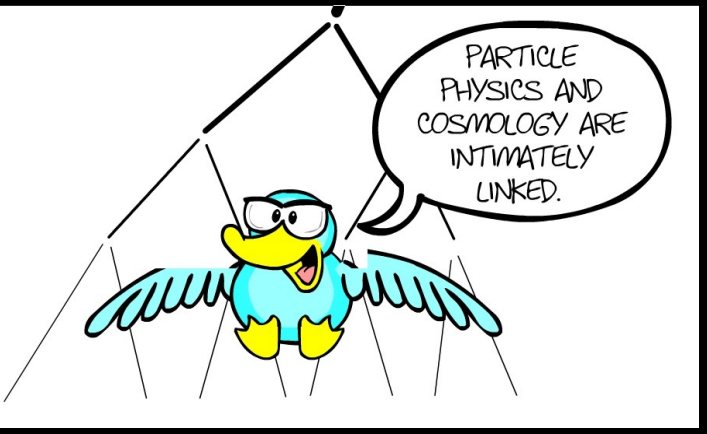
Departures : Ana, Anna, Anirut, Arturo@ CPPM in January

Eric, Albert, Marceau, Manu

Fusion with cluster circle ? try to keep a regular discussion

Cosmology ↔ Particle physics



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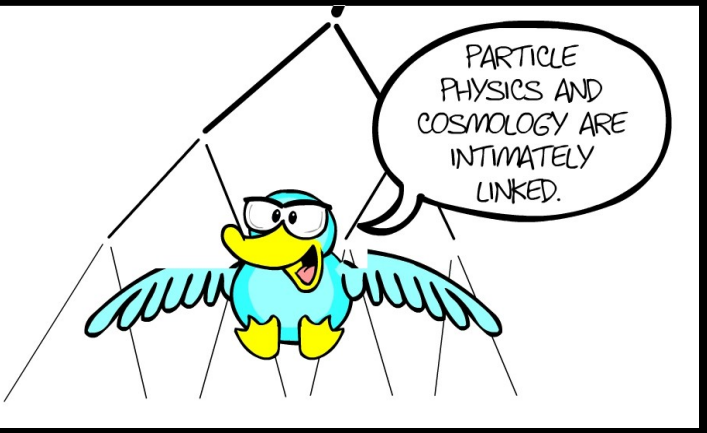
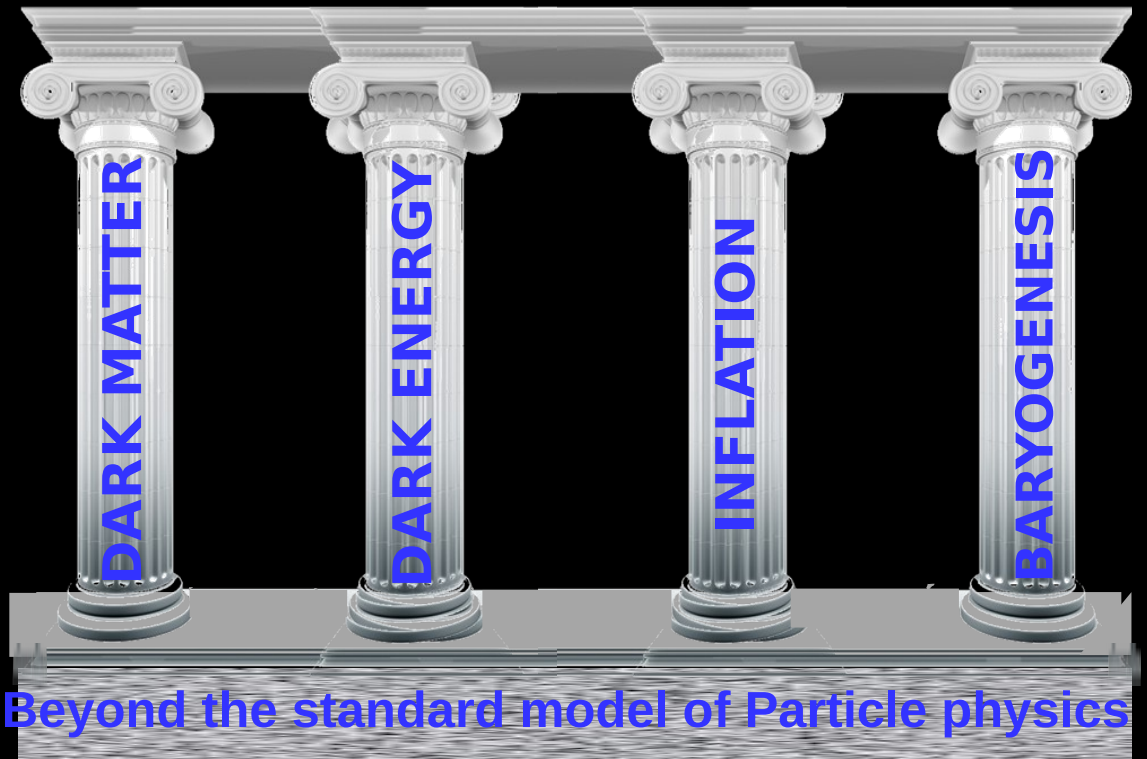
Standard model of Cosmology : ΛCDM





Beyond the standard model of Particle physics