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Some observations on the KIAS-11 workshop…

- First, I'd like to offer my profound thanks to Changbom for first creating and then maintaining this series of workshops over many years. Conference series have a special place in the research ecosystem, since they develop a particular character and focus that persists over time and that supports and nurtures the long-term development of their research field.
- At a personal level, I particularly enjoy focussed workshops where a substantial fraction of the talks either are either directly relevant to my own research or provide valuable context for my research, as was the case at this workshop. As a bonus, I found several of the talks on topics far from my own focus either illuminating, or entertaining, or both.
- One clear conclusion from the talks in several research areas is that astonishingly powerful new datasets are coming down the pipeline, and that these datasets have at least the *potential* to make a big impact on some of the important open questions in our field. As an observer, I am really excited by these prospects and look forward with keen anticipation to the next 5-10 years!
- I'm also impressed by the increasing power and sophistication of the analysis techniques being brought to bear on these big new datasets, especially the exploitation of recent advances in machine learning methods to cleverly address problems that would otherwise be out of reach. Exactly which areas such methods will eventually have a decisive impact on is not entirely clear (at least to me), but their potential seems to be extraordinary and we are only just beginning to make real use of these techniques.
- On the other hand, however, it seems to me (and I may be mistaken!) that cosmology remains a field where progress depends almost entirely on observational discovery, with relatively little theoretical guidance. We are filling out the details in the framework of the standard cosmological model, but are left with the same big questions that we started with: what is dark matter? what is dark energy? what is the origin of inflation? etc..

Moreover, it seems that observations are rapidly narrowing the windows of opportunity to answer these questions with existing methods, and that there are few fresh theoretical ideas that sharply focus future work.

- Having said that, I will offer the historical perspective that cosmology seems to have been in a 'crisis' of one sort or another throughout my career. Looking back, these 'crises' have fuelled extraordinary progress in the field - we know *vastly* more about the universe now than when I started my PhD 40 years ago, and I don't believe that we have yet hit a limit to our ability to probe and understand the universe.
- Finally I have greatly enjoyed this meeting. So, whether or not there are future KIAS workshops, I look forward to meeting you all at future conferences and seeing where our field is going.

Christophe Pichon

Having been promoted to KIAS scholar thanks to Changbom's invitation in 2014 and while typically spending a couple of month in the fall, I have had a privileged standpoint to witness how much they have grown over the years.
As a passive visitor, I can confirm that there is a lot of work ahead of each workshop to make sure everything works smoothly for our benefit.
I would like to highlight the broadening of the topics covered by the workshop. It reflects a long term strategy of Changbom to actively develop and promote certain specific topics of research, such as instrumentation development, which are not typically favoured by the publish or perish philosophy that we impose on our young colleagues. To take another example, one of the simulations amply discussed in this workshop is HR5, which is the 5th of its family: this is another illustration of Changbom's consistency and determination.

Moving on to the specificities of the result presented in this workshop, I will not attempt to go through any review of the many excellent talks, because it would probably be quite tedious, and would not go well given my complete lack of skills for this kind of exercise. I will therefore restrict myself to a few general comments.
The professional polished level of the talks is one unifying feature, my own presentation notwithstanding. It probably reflects a general trend, driven by the size of modern collaborations, and also certainly cross-emulation amongst young and not so young astronomer. While this is globally a good

thing, the format of a workshop thankfully also allows for in-depth informal discussion, which have proven very useful.

The range of topics covered by the workshop was particularly well suited to allow each of us to learn efficiently from our own field, but also from neighbouring fields. As it probably the case for many of you, my scientific interests have in the past shifted across some of those. This workshop provided me with updated context for my own research. It was stimulating to see that these fields continue to evolve and mature without me!
I was impressed by some of the talks which are outside of my zone of comfort, such as Taruya's, Sree's, or Rain's. As always, learning from scratch is most gratifying!
Though subjective, I found the session I chaired particularly enlightening, which probably just reflect my level of concentration! I was also quite impressed by the work discussed during the large scale structure session.

The focus on galactic and larger scales resonates with my current scientific interest on the importance of scale coupling, which IMHO our community should embrace. I cheekily use briefly this opportunity to make my case one last time! Indeed, important theoretical breakthroughs have recently been made in the neighbouring field of gravitational dynamics involving kinetic theory and large deviation theory. I came here to try and convince you that these are theoretical tools that we should import, both for the benefit of understanding of what is happening in our simulations, but also to debias our cosmological estimators while accounting for their shortcomings.

More generally, returning to my general comments, new spectacular results from major surveys like DESI, DES, HSC etc are all pointing to interesting novel cosmological constraints, stimulating upcoming surveys. All these great achievements and prospects also provide good material for upcoming KIAS cosmology and galaxy formation workshops.

So in closing, congratulations to all for the success of this year's workshop!
Special compliments to Jaywon, Jeong-Gyu and Priya for all the logistics.
And finally Changbom, thank you again for inviting me to the 11th workshop!
Looking forward to the next ones so I can collect more stars!