

INSTITUTE FOR ADVANCED STUDY

E-mail: [REDACTED] Phone: [REDACTED] FAX: [REDACTED]

SCHOOL OF NATURAL SCIENCES

MATIAS ZALDARRIAGA, PROFESSOR

February 1, 2015

Dear Colleague,

It is a great pleasure to support the nomination of Meng Su for the Origins prize lectureship. I think Meng is an outstanding young scientist with an impressive track record of accomplishments for someone his age. Meng is also very ambitious and thus I am confident he will become one of the leaders in our field.

Below I append the letter I sent for Meng earlier this year as part of his job application process. It contains a more detailed assessment.

I think Meng is an excellent candidate for your prize. You will not be disappointed if you pick him. In fact I am confident that years down the line the presence of Meng in the list of recipients will be a significant source of pride.

Regards
Matias

October 15, 2014

Dear Colleague,

It is a pleasure to write a letter of reference for Meng Su. Meng did his PhD work under the supervision of Doug Finkbeiner at the Harvard astronomy department. I met Meng while I was there and worked with him on several projects. I believe Meng is a very strong scientist, very driven, resourceful and independent. It is a pleasure to support his application.

Meng has done very important work analyzing data from the Fermi telescope. His most important result was the discovery of the so-called "Fermi-bubbles," for which he shared the 2014 Rossi Prize with Finkbeiner and Slatyer. This observation might provide direct evidence of "feedback" on our galaxy by its central Black Hole. I believe the detailed study of these structures in the center of our galaxy will prove extremely fruitful in the years to come.

Meng devoted significant time to doing detailed modeling of gamma-ray emission from the galactic center and has done very influential work on the claimed 130 GeV line. Meng's work argued for the existence of this line but also uncovered systematic effects in the data that could

partially explain it. It remains unclear what the origin of this anomaly is, but significant doubts about a dark matter interpretation have been raised. At the present time, the evidence seems marginal. Regardless of how this issue is settled, Meng has done very high quality work to try to address one of the most important puzzles in Cosmology, the nature of the dark matter. It is a very competitive field and Meng has played a leading role.

I will now comment on some of the work Meng did with me. When Meng arrived at Harvard, he wanted to start doing research right away. At the time, I was involved in making various forecasts for a balloon-based CMB polarization experiment (EBEX) which, in addition to trying to measure the so called B mode polarization, wanted to reconstruct the gravitational lensing deflection angle from the statistics of the small scale anisotropies. At the time, we were interested in understanding how well such an experiment would have to control various systematic effects to be able to make this measurement, so we could advise our experimental colleagues during the design process. Meng, together with postdoctoral fellow and EBEX team member Amit Yadav, worked this out, resulting in the paper "Impact of Instrumental Systematic Contamination on the Lensing Mass Reconstruction using the CMB Polarization" (Phys.Rev. D79 (2009) 123002), as well as some internal memos. Meng did a very good job, worked fairly independently, and he taught himself quickly all of the various technical tools needed to do those calculations. If I had not left Harvard, I would have taken him as a graduate student.

Both Amit and I left Harvard soon after this work, but through the years Meng and Amit continued working on several follow-up projects where Meng could use the tools he had learned. These ranged from other calculations related to instrumental systematics, such as "Primordial B-mode Diagnostics and Self Calibrating the CMB Polarization" (Phys.Rev. D81 (2010) 063512), to studies of potential signals from the epoch of reionization, "An Improved Forecast of Patchy Reionization Reconstruction with CMB" (arXiv:1106.4313 [astro-ph.CO]). All these collaborations happened remotely, while Meng was working on his thesis. Meng worked independently, came up with many of the ideas and wrote the majority of the drafts.

These projects are by no means the bulk of Meng's work during his graduate career, nor do they represent his most interesting work. They show, however, that from a very early time he was very mature and worked with the level of independence of a good postdoctoral fellow. He is even more impressive now.

In summary, I think Meng Su is a remarkable scientist. I think he is among the very top postdoctoral fellows in Cosmology. I support his application in the strongest possible terms.

Sincerely yours,

A handwritten signature in black ink, appearing to read 'M. Zaldarriaga', with a large, stylized loop at the end of the last name.

Matias Zaldarriaga