NSF REU (2015), (PI: Dr. X.Li, Co PI: Dr. Satyanarayana)

Title: REU Site: Research Experiences for Undergraduates in Computing Technology at Minority School

Strengths:

The PIs are well qualified and have had experiences supervising UG research projects.

With emphasis on system and application oriented projects, the student activities are well defined and well presented.

It is a good idea to bring back the City Tech alumni who are in graduate schools to serve as mentors for the REU participants.

Weaknesses:

The proposed site includes many faculty mentors (6) and many diverse research areas (7). With 10 student participants, it is not clear how the students will be divided among the mentors and the projects.

The recruitment and participation of graduate student mentors may be problematic because these graduate students are hired from external institutions and may not be familiar with the research projects at CUNY NYC College of Technology. In addition, the graduate students may not have much incentive (other than financial) to mentor UG students.

The year-long feature of the proposed site for continued engagement of the REU participants in activities beyond the summer and into the academic year may be problematic because both students and the faculty mentors will be very busy during the academic year and may not be able to dedicate sufficient time to the planned activities. Also, the details of the logistics of how academic year follow-ups will be conducted are missing.

Strengths:

The panel noticed and appreciated the fact that CUNY NYC College of Technology is a Hispanic Serving Institute and well positioned for attracting and recruiting minority students to the proposed REU Site program. The outreach and recruitment plans are strong and include letters of commitment by several local institutions.

The commitment to diversity is strong, including recruiting 60-70% (discrepancy for the exact number in the proposal) minority students.

Weaknesses: None noted.

Constructive suggestions for improvement:

The PIs may consider a better-defined and more focused research theme instead of the current broad, diverse research topics.

The wisdom of hiring external graduate student mentors is questionable; perhaps the PIs can consider a deeper commitment to mentoring by the large number of interested faculty in this REU program.

Consider a summer only program or if longer-term programs are considered, be specific as to how success will be achieved given competing priorities for both faculty and students during the academic year.

Summary/Rationale for panel's recommendation, including key strengths and critical weaknesses:

Overall this is a good REU Site proposal with nice features for recruiting minority students in the NYC area, having well-defined student activities, and involving research active alumni as mentors. The assessment and data management plans are well done. However, the proposal can be improved by a better-defined and more focused research topic and deeper faculty commitment to mentoring (instead of hiring graduate students).
Panel Recommendation: Low Competitive

CIRG 2014

Proposal Number: 2142

Title: The big data revolution in Astronomy: improving efficiency and speed of spectral energy distribution fitting for large galaxy catalogs

Lead PI: Dr. Acquaviva, Co-PI: Dr. Satyanarayana

Reviewer's Narrative:

This is a well-motivated and a well-written proposal on a very timely and important topic. Interpreting properties from galaxy spectral energy distributions is a challenging task, and will become even more challenging in the era of large galaxy surveys, like the LSST. The team introduces a new and high-quality method which will yield accurate results in a tiny fraction of the time it takes at this moment. The team has complementary expertise which greatly benefit this project. They have the knowledge and skills needed to perform and successfully complete the proposed tasks. In particular, I am very impressed by the creative idea to use hierarchical clustering in their code. To my knowledge, this is a completely new technique in this field. However, I think that this will become the new standard, after the team has released their code. Furthermore, this idea demonstrates the potential of this team to advance the field with creative and interdisciplinary work. The produced code will have direct applications to current datasets, and moreover will be crucial for all future galaxy surveys. Due to their extremely large sample size, it is basically impossible to use current codes to derive galaxy properties. Thus, this program has a high potential to generate its own external funding.

Reviewer's Narrative:

The proposal addresses the issue of determining physical parameters of galaxies from analysis of their spectral energy distributions (SEDs). The parameters include staf formation histories (SFHs), dust content (and distribution). In principle this is a typical inverse problem, but turns out to be difficult for a variety of reasons. The proposal is centred on two new approaches - one is a grouping of 'similar' galaxies, to reduce processing time, and the second is an investigation of variants of the standard MCMC sampling approach. The proposal correctly identifies degeneracies as being a significant source of difficulty, and this will be acute for the sort of data envisaged here. There are many issues which are not addressed very much or at all in the proposal, such as the parametrisation to be investigated (how will the SFH be parametrised? Dust?), how will positivity of SFHs be imposed? There are other issues which are less crucial for this, such as uncertainties in the theoretical modeling, but that matters less in that the techniques developed could be applied to newer models as they become available. So I have some reservations about the astrophysical science which will come out from the study, but the methodological aspects are themselves quite interesting, and the exploration of both the pre-analysis classification and the PT ensemble MCMC algorithm are worthwhile. Given the stage of the research, the emphasis on the CPU timings seems premature; I would like to have seen more plans to test how well the method works, to check that it indeed does, and to find where it might fail. Once this is established, then the time required might become an issue for future surveys, but it's only relevant if the method is useful. The project itself is however quite suitable for the undergraduate resources which are requested. Indeed, keeping the focus on these aspects and investigating only these algorithmic parts makes a lot of sense, and the involvement of an astrophysicist and a computer scientist in the supervision team is good, and may lead to further interactions in advance of the data challenges which are to come with LSST and other projects.

NSF 2013 (PI: Acquaviva; Co-PI: Satyanarayana)

Review #1

RUI: Determining the physical properties of galaxies in the era of big data

Rating: Excellent

REVIEW:

In the context of the five review elements, please evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

+ Improved SED fitting tools to extract maximal information in minimum time. Optimize heirarchical clustering to classify galaxies into similar SEDS before fitting. Replace model SED computation with analytic fitting formula. Replace Monte Carlo Markov Chain algorithm in SpeedyMC code with more robust and efficient one. Use CANDELS data to bin SF as function of time for each galaxy (stack to increase S/N). Simultaneous use of spectroscopic (emission lines) & photometric data.

+ PI experience in SED fitting

+ Create Python version of SpeedyMC

+ GUI version of spectrum generation for educational use In the context of the five review elements, please evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

+ Tools, products released to community

+ cross disciplinary research

+ Improve student skills

Summary Statement Excellent proposal to improve speed & accuracy of SED fitting. Improvements appear both logical and achievable. RUI has excellent potential impact.