

Introduction

The Annual Meeting of the External Advisory Committee of CHEPREO met at Florida International University on Monday, October 3, 2005. In attendance at the meeting were the principals of the project from the three components at FIU and from the affiliated project institutions of Caltech, University of Florida, and Florida State University. During the day long meeting other members of the FIU community visited the meeting, including the Vice-president for FIU research, and the Dean of Arts and Sciences. Other faculty and students visited the day long meeting. The people present for the entire meeting were:

Mark Adams , External Advisory Committee	Thomas Greene , External Advisory Committee
Heidi Alvarez , FIU CIARA, AMPATH, WHREN-LILA	Steve Linn , FIU Physics
Paul Avery , UF Physics, Grids, E/O	Pete Markowitz , FIU Physics
Yuri Gershtein , FSU Physics	Brian Meadows , External Advisory Committee
Vasken Hagopian , FSU Physics	George O'Brien , FIU, Education
Julio Ibarra , FIU CIARA, AMPATH, WHREN-LILA	Harrison Prosper , FSU Physics
David Jones , M-DCPS Physics Teacher, Palmetto HS	Ernesto Rubi , FIU CHEPREO IT Support & Network Engineer
Laird Kramer , FIU Physics & E/O	Xun Su , CHEPREO Lead Network Engineer, Caltech

The inclusion of students in the presentations to the committee added an awareness of the central focus of this project, students. Their enthusiasm for the success they have had was very contagious. A more formal and complete treatment of the various aspects of CHEPREO by members of the organizations at FIU (Physics, Education, and members of the affiliated organizations of Caltech, UF, and FSU) was most beneficial both in the information given and as a visible statement of the basic collaborative nature of the project. From these presentations, the committee belief that CHEPREO is a significant program that interrelates particle physics, computer science, and education and outreach, all coming together at one location – FIU, was reinforced.

With the project in its third funding year, the programs have progressed to a point of showing visible benefits. The promise of some major returns on the investment will clearly occur if the program is given the time to achieve its original goals. It seems clear that because the program has been successful to date, and is tightly connected with the CERN LHC that will come on-line in two years; the possible two-year extension of the project will benefit the several communities involved and would allow a full return on this investment made to date. If a two-year extension is the intent of NSF, then the advisory committee recommends that a clear indication to CHEPREO members should be given as soon as possible. This is a recommendation because this project involves many administrative units and some are slower than others in reacting to new information.

From the beginning this complex project has been dependent on the quality of the personnel in the original team and the ability of that team to add new members as the design required. It is very satisfying to note that the position of Educational outreach Faculty has been filled by Jeff Saul.

The ‘Glue’ function for cyberinfrastructure that is filled by Xun Su, is a great benefit to both the project and to Caltech. The nature of infrastructure is that many of the undocumented pieces are carried between institutions by an individual. This task when done well, makes the person the glue that keeps the physically separate pieces working together. Xun Su, CHEPREO Lead Network Engineer is filling this function very well and enabling leveraging of the global Ultralight networking project.

It has been noted in earlier discussion that CHEPREO is primarily ‘a project in collaboration’. The many pieces involved in the several domains that are crossed will not have many new research pieces added directly to them by CHEPREO. The pieces are being ‘integrated across disciplinary boundaries’ and that is the real achievement of the project. Because CHEPREO is sited on the FIU campus in South Florida, it is positioned to form bridges not only among these varied programs in education, Physics and computer science, but it may cross cultures, English to Spanish, and continents, reaching over to Europe and across to South America. This gives many new opportunities to people with imagination and a willingness to explore new approaches.

Committee Discussion Points:

Following the format established by the 2004 advisory committee, after hearing the presentations and responding interactively, the 2005 committee formed its impressions of the program and formulated several discussion points that were presented at the time of the closeout.

I. CHEPREO program: The program provides a strong support structure that integrates several areas – High Energy Physics (HEP) research for the University faculty and graduate students who are involved, a set of education and outreach initiatives, and a center for providing computer network support important to HEP as well as to the other activities. The education initiatives, though not CHEPREO originated, include well-established and effective programs. Among these are QuarkNet, Modeling and REU. CHEPREO provides access to state-of-art facilities for the largely Hispanic community that Florida International University (FIU) supports. Other programs that CHEPREO is associated with include: GriPhyN, iVDGL, AMPATH, STEMS, COMAP, QuarkNet, and the AMPATH STI-REU network monitoring supplement.

II. Sustainability of CHEPREO: The programs in CHEPREO are not ones originating in CHEPREO. However, as noted by the external panel last year, the intrinsic value of the program is in demonstrating how the various state-of-art activities covered can be ‘integrated into the life of a campus such’ as FIU, with its largely non-traditional population, and how the activities can spread into the surrounding community. The value is also in the hope that such programs can be developed elsewhere, modeled on the successful example at FIU. On general grounds, it seems that the continued support of CHEPREO would be easier to justify for an agency such as the NSF as a successful collaboration experiment, possibly as a model of multi-disciplinary collaboration, than for the individual components.

The panel is positively impressed by the efforts made by the participants to make the program a success at FIU. Several instances are noted that would be unlikely to occur without CHEPREO. One example - undergraduates are introduced to physics research at CERN. This experience so early in their careers should have a profound effect.

The panel recommends that, as the program is in its third year, some additional effort be put into a demonstration of, and emphasis on, those aspects of the program that can be propagated elsewhere. Funds expended on items forming part of such aspects should be clearly identified as either coming from CHEPREO, or being leveraged by funds from CHEPREO. Some thought should be given to showing how others may follow the examples set by CHEPREO.

Continued and strong collaboration across campus, and into the surrounding community, are also essential to the sustainability of the program. The excellent notion of a “community of scholars” that may be a CHEPREO invention should be fostered. An expansion further into this community to include parents, local community leaders and possibly also the political structure of the community might be

considered. Enhanced contact with students in the schools is also encouraged. Finally, the panel emphasizes the need for a serious assessment effort for the education and outreach components.

III. Education and Outreach: The hiring of Jeff Saul is a positive development. It is hoped that, with his added expertise, a strong attempt at evaluation of the effects of these efforts may be attempted. Some assessment of the program, or plans for this, should be made available to the next NSF review panel. The efficacy of each aspect of the program needs some assessment. For example, a question might be to ask how the modeling program compares with QuarkNet, or other known initiatives. For instance, is an aspect good for the best students, or for the general spread of interest in science?

We were also pleased to see the CHEPREO Grid education effort at UF leverage the 2005 Grid Summer School, sponsored by GriPhyn/iVDGL, by editing the extensive course materials to create course modules, putting them on a web page and making them available for additional Grid tutorials. Participants from Argentina and Brazil who also attended the PASI in Mendoza earlier in May 2005 were in attendance.

Though enrollments at FIU are not a major concern for a Federal funding agency, an increased enrollment in physics may be. It may be possible to demonstrate that increased enrollment in the number of physics majors propagates to an increase in the number of science teachers in the area high schools, and an increased interest and knowledge in science in the community.

The panel is impressed with the physical layout of the Physics Learning Center (PLC) promised by FIU as a facility to be used in these efforts. They are particularly impressed by the large use made of this by the students. It is, however, noted that not all the promised space has yet been converted. This commitment, made by FIU to the NSF, needs to be addressed.

IV. High Energy Physics: The panel is pleased that the role played by CHEPREO has produced a viable effort in FIU participation, with its partners from FSU, UF and Caltech, in the CMS experiment. The impact by the networking component on the Grid physical hardware – an essential part of CMS – is also noteworthy. Steve Linn, recently hired by FIU using CHEPREO funds, is a key player in the slow controls system for CMS. The panel was particularly impressed by Steve's presentation, in which he described how two FIU physics undergraduate majors were able to contribute effectively to that project at CERN last summer.

Steve's appointment, based on CHEPREO funds, was originally as a senior postdoctoral associate. The panel is concerned that this hiring mechanism may leave some doubt as to the transition of such a position into a regular, tenure-track faculty line. It is also a concern that the second faculty line, promised by FIU as part of the establishment of a HEP activity in CHEPREO, is not yet forthcoming. The panel would like to emphasize that, as the beginning of the CMS experiment nears, the second position will become essential. An excellent presentation of the CMS activities at FSU, by Vasken Hagopian, highlighted the fact that FSU students are actively pursuing physics simulation projects. FIU students must be ready for the first physics from CMS too, and this will clearly be aided by the presence of a further HEP faculty member.

V. Cyber-Infrastructure: The networking provided by CHEPREO brings together computer science as a study, physics as a study and education as a study. Collaboration with the computer science department appears now to be established, with computer science course (modules) taught to physics students (and vice-versa). The volume of data flowing out of CERN is now a challenge to computer science. But of course the planning is for the huge increase in data flow that will occur when the LHC comes on-line. The movement of information is a good focus and by working on a real problem, will help grow the infrastructure for many other fields besides physics to use to their benefit. CHEPREO contributes significantly in the infrastructure required for realizing the connectivity required by the CMS experiment. Collaboration with its CMS partners is essential in bringing this effort together. The engineer also is providing leveraging of other NSF funded projects such as UltraLight. This interaction creates a powerful link between Caltech and the UltraLight global effort for CHEPREO. Additionally, FIU's geographical

proximity and close working relationship with UF has substantially benefited CHEPREO's local cyberinfrastructure, permitted FIU to be a full member of the Grid3 national cyberinfrastructure and, most recently, to participate fully in the Open Science Grid. CHEPREO's involvement in OSG offers many new possibilities for dissemination as well as the formation of new partnerships.

This global cyber-Infrastructure effort for research and education allows CHEPREO to foster first-rate Latin American involvement in the LHC program as well as the current HEP program at Fermilab. An additional benefit of this growing collaboration is that HEP can show the way as a collaboration model for other sciences. Progress is being made towards permanently connecting - Universidade de São Paulo(USP) and Universidade do Estado do Rio de Janeiro(UERJ) to the CHEPREO/WHREN which will enable full participation by them in the HEPGrid effort.

Xun Su's work and the Cyberinfrastructure component in general - are vital for:

- Enabling effective use of the WHREN Sao Paulo-Miami and other links between Latin America and the US
- Allowing the Brazilian HEPGrid clusters to federate effectively with the US Tier1 at Fermilab and the Tier2s at US CMS, starting with Caltech and Florida.
- Also to reach CERN over an engineered set of links (WHREN-LILA and US LHCNet) rather than using the general GEANT infrastructure in Europe at lower performance
- In the future, through the work of the Brazilian HEPGrid, allowing the vision of an HEP Grid throughout Latin America.

VI. FIU commitments: We believe that commitments made by FIU to provide PLC space and physics personnel are of major impact to the project and must be completed. The search for a new HEP faculty member should start as soon as possible, so that the CHEPREO initiative can provide the opportunity to FIU graduate students to fully participate in the CMS experiment. The enthusiastic use of the limited space can only increase when the promised space becomes actually available to the project.

In conclusion, again this year the panel's overall impression is again a positive one. CHEPREO has made progress since last year. With some attention to the points raised, we believe its continued strong support by the NSF is well justified and the program should be supported for at least two more years to allow full benefit of the complex relationships technical and human that it has developed.

The Committee really likes this project. It seems that too few projects that are pressing the envelope of collaboration actually exist. This project with its clear reach for collaboration and broad impact as a focus, gives substance to the often voiced objectives of broad impact and wide collaboration. It is a very good project.

Lastly, the committee thanks CHEPREO staff, teachers and students and FIU Officials for their hospitality during the review.

Respectfully Submitted:

Mark Adams, David Jones, Thomas Greene and Brian Meadows