

## **VLT-PAC Report October 2004**

### **Introduction**

The VLT-PAC met for one day on October 20-21, 2004 at the Princeton Plasma Physics Laboratory. A list of the attendees and the agenda are attached to the end of the report for reference. The purpose of the meeting was to review the contributions of the VLT with respect to ITER as well as to comment on several other program components, in particular the NSO and ARIES programs.

The basic charge to the PAC was derived from several issues raised by VLT-Director Charlie Baker.

1. Is the relative emphasis of VLT activities on ITER-related work appropriate given that a site decision is still pending?
2. The NSO/FIRE design work has been set aside replaced by a new activity that will examine AT issues. Is this an appropriate direction for the NSO activities?
3. What should be the future direction of the Advanced Design (ARIES) activities after completion of the compact stellarator study?
4. The Plasma Chamber (formerly Fusion Technology) area has been reduced and redirected to work on the ITER test blanket module activity. Is this an appropriate direction for the Plasma Chamber activities?
5. The IFE technology work (chambers and target fabrication) has been stopped in FY 05. What impact will this have on IFE fusion research?

After hearing presentations from Warren Marton (OFES), Gene Nardella (OFES), Charlie Baker (VLT), Dale Meade (NSO), and Ned Sautoff (ITER) the PAC discussed the issues and prepared the report given below.

### **Background**

The VLT has three basic missions: (1) provide enabling technology for existing fusion experiments, (2) provide enabling technology for ITER, and (3) carry out fusion technology research for both MFE and IFE. The VLT PAC supports these three missions which we consider critical to the development of fusion.

The VLT has the flexibility to shift resources between these missions in order to meet both the changes in priorities of the overall fusion program and new technical challenges. In this connection the fundamental issue at the present PAC meeting is the near-term allocation of resources given the immediate needs for supporting R&D for ITER. We recognize that this is a transitional period, but even so, care should be taken to ensure these shifts do not compromise the core capabilities of the VLT.

The VLT-PAC believes that ITER represents an outstanding opportunity to contribute to fusion research for the VLT and the entire fusion community. Because of the near term needs of ITER, the VLT has already been highly responsive to this opportunity. The PAC notes that a comparably detailed plan addressing the needs of ITER and burning plasma physics has not as yet been prepared by the remainder of the US fusion program.

In summary, the PAC supports the VLT Director's plan to continue support of all three VLT missions with an increasing near-term emphasis on ITER.

### **Detailed responses to VLT issues**

#### ***Question 1: Does the VLT correctly apportion its resources between support for existing experiments and ITER?***

Given the current uncertainty in the ITER site selection, the VLT has done a good job apportioning funds for enabling technology research between existing experiments and ITER. If the ITER site decision is made in the near future, the VLT may have to shift more of its immediate effort towards ITER. Specifically there will be a need to increase short-term ITER R&D in order to progress along the formal DOE series of steps required for approval of large projects. This can only realistically be accomplished by a reallocation of existing VLT funds impacting other areas of the VLT program. We support this potential additional reallocation. However, future PAC meetings should readdress the balance between all three program elements.

#### ***Question 2: What is the role of the NSO in the VLT programs?***

The NSO has achieved one of its primary missions – developing a successful pre-conceptual design for FIRE, the contingency plan for a US burning plasma experiment. The NSO is currently focusing its efforts on exploring AT operation in ITER. The research on advanced tokamak operation will be of value to both ITER and FIRE. This activity should be reviewed by the PAC following an ITER decision as part of a broader burning plasma program, which has not yet been developed by the US fusion community.

#### ***Question 3: What is the role of ARIES in the VLT program?***

The ARIES system studies projects have been very important in the fusion program. In fact it is quite literally true that the major scientific direction for future tokamak research – AT operation – is based on fundamental issues raised by the ARIES group. The current mission of the ARIES group is to complete a study of the compact stellarator. This is very important and should definitely be supported to completion. The compact stellarator addresses one possible Achilles heel of the tokamak – the need to achieve steady state operation with a very high bootstrap fraction and a corresponding small amount of current drive power. The stellarator needs no current drive to achieve steady state. The ARIES study will illuminate the tradeoffs involved in eliminating current drive versus building more complex modular coils. It is expected that the ARIES program will continue to have major impacts on the scientific directions of fusion research.

***Question 4: Is the redirection of the Plasma Chamber Technologies program element to ITER Test Blanket Modules appropriate?***

This redirection benefits both ITER and broader fusion development needs. It also takes advantage of international collaboration. The PAC supports this decision.

***Question 5: What core competencies have been lost resulting from recent program redirections?***

The elimination of IFE technology and the redirection of the MFE chamber technology has eliminated core competency in thick liquid wall research. The PAC regrets the loss of this capability.

## VLT PAC Meeting

Thursday, October 21

1:00	0:10	Welcome and Introduction	Freidberg
1:10	0:30	DOE Comments	Willis
1:40	0:30	VLT Overview and Issues	Baker/Milora
2:10	0:30	ITER Activities with Emphasis on Technology Needs	Sauthoff
2:40	0:30	NSO Activities	Meade
3:10	0:15	BREAK	
3:25	2:05	Discussion	
5:30		Adjourn	

Friday, October 22

8:30	0:10	FY04 Budget Status	Baker
8:40	0:30	General Discussion	Freidberg
9:10	2:20	PAC Executive Session	
11:30	0:30	Closeout Session	
12:00		Adjourn	

## **List of Attendees**

J. Freidberg (Chair)  
R. Hawryluk  
B. Hooper  
A. Kellman  
J. Kwan  
K. Schoenberg  
J. Sethian  
S. Willms