Part 1 - General Information

Project Title: Limits of operation and enlargement of operational domain in the ADITYA tokamak
Start date: Sunday 23rd January – Saturday 5th February 2011
Duration: 2 weeks

Part 2 - Exchange Participant(s) Details

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Part 3 - Scientific & Technical Information

3.1 Purpose of visit

(Briefly describe the purpose and goals of this exchange.)
The general purpose is to increase the scientific relations between our two tokamaks, TCV at EPFL, ADITYA at IPR.
The specific goal of the visit to ADITYA was to extend/improve tokamak operation, in terms of plasma current and density. This is linked to MHD stability and density limits, where MHD activity, plasma impurities (Zeff), play a role in limiting plasma operation.

3.2 Short description of work carried out during the visit

(Please describe the technologies acquired and the experiments/activities performed during the course of the exchange.)
Participated in ADITYA tokamak operation.
With the aim of better understanding some of the diagnostic signals outputs, care was taken that different diagnostics, which can give similar information should be compared and checked whether they yield consistent results for the same physical quantity. Some examples:

- plasma vertical position from magnetic measurements, to be confirmed by soft X-ray multichannel detection from the low field side (LFS),
- through the appearance of bursts of MHD activity around integer values of the safety factor q, check of the consistency of plasma radius (determined by plasma position), plasma current and magnetic field.
- A better understood plasma position may help better distinguishing plasma soft X-ray emission from wall fluorescence in discharges with some electron runaway content,
- which in turn can be of help in the frame of the interpretation of electron temperature from soft X-ray absorber technique, e.g. in validation of heating during ICRH (Ion Cyclotron Heating) experiments on ADITYA.

Discussions took place and contact to a reference person was taken, in order to determine an optimal tokamak wall conditioning method (boronisation) for a vacuum vessel remaining at room temperature. This method uses uses trimethylboride (B(CH₃)₃).
During the two weeks stay, I gave two seminars, centred on TCV results, entitled:
1) “Turbulence and transport reduction with innovative plasma shapes in TCV - correlation ECE measurements and gyrokinetic simulations”;
2) “The TCV tokamak – some of the past, present, and future”
This second seminar contained specific points also relevant to ADITYA operation (modes and disruptions domains of operation in circular/shaped tokamak) and stressed some points in view of potential collaborations on TCV.

3.3 Outcomes

(Please describe the main results obtained during the course of the exchange.)

The visit allowed progressing on the understanding of aspects of present operational limits in ADITYA and led to some suggestions on ways to improve plasma operation. The visit certainly was undoubtly short to measure a direct outcome on tokamak operation.

3.4 Future collaboration with host institution

(Please provide information on future collaboration opportunities and follow-up activities.)

Examination of the boronisation procedure and system implemented at TCV during the next visit to TCV of Prof. Prabal K. Chattopadhyay in view of ADITYA boronisation.
Implementation of further collaboration on TCV on themes such as density limits, gas injection to the discharge, H-mode operation.
3.5 Various comments

(E.g., what worked well, what didn't work well, suggestions and improvement ideas, …)

Excellent visit. Good interactions. Too short, but useful for both sides.
Since I could get flight tickets at a low price, typically half the price of the fellowship amount, it appears possible to use the remaining part for a later visit, possibly next year, typically end 2012.

3.6 Projected publications/articles resulting or to result from the exchange

(if applicable)