several meetings have been documented and the assessment can be completed with some more effort to document the measurement feasibility (achievable S/N, time resolution etc.). A few new proposals for the lost alphas as well as the confined alphas were discussed at this meeting; 1) the idea of reciprocating probe with the detector inside requires further detailed engineering study due to uncertain reliability and feasibility of features such as active cooling below ~350 C on ITER. Possible implementation schemes are being explored. This idea has a limited time resolution. The measurement technique based on activation is also lacking sufficient time resolution. 2) A method to achieve a reliable information on the confined alphas using NPA measurements of the fast neutralized knock-on D^+ and T^+. There was some concern expressed on whether, if these pre-feasibility studies turn out to be sufficiently promising, ITER is able to integrate any of these systems within the planned diagnostic ports.

2.2 HP#2: Determination of life-time of plasma facing mirrors used in optical system

The First Mirror Working Group reported significant progress on several tasks of the Working Plan (WP), including test results from AUG and international efforts on various operating devices. A First exposure of diagnostic mirrors for ITER in a tokamak with

Results of laser cleaning of mirrors were reported for hydrocarbon and Alumina deposits (positive) as well as B_e deposits (negative). The poor results with B_e are attributed to an over-long laser pulse, so further tests with shorter pulses are needed. The system of exchanging sealed capsules containing Be-contaminated mirrors was proven effective, thus allowing round-robin tests of Be-coated mirrors in multiple facilities.

Assemblies of diagnostic ducts with various duct geometries to mitigate the impurity deposition - the so-called Mirror stations were manufactured by FZJ and are being installed in several tokamaks for the experimental benchmarking of ITER mirror codes. Some of the ducts are protected with shutters. This effort is made in the frame of IEA ITPA Joint Experiments program, task DIAG 2 and involving TEXTOR, DIII-D, ASDEX Upgrade and EAST tokamaks. This HP item will remain.

2.3. HP#3: Assessment of impacts of in-vessel wall reflections on diagnostics

Many of the optical diagnostics will have to work against the background of stray light coming from the plasma and, because the ITER plasma is much larger than existing tokamak plasmas, this problem will be more severe than that experienced thus far. The problem needs to be evaluated through a process of modeling and measurements on existing machines, and measurements of the reflectivity of relevant materials. Effects of reflections were discussed in the case of the IR/visible survey system, especially in the divertor area. Derived local temperature can appear much higher when reflections from a hot surface onto the target are included. Studies of the H system were also presented, showing typical levels of reflected divertor emission two orders of magnitude above direct emission observed from equatorial views of the inner wall. Viewing dumps and/or techniques employing Zeeman splitting were identified as mitigation options.

Extensive R&D efforts are ongoing at W7-X to quantify and study the effects of stray microwave radiations onto diagnostics and other in-vessel components. An update on research plans was presented, indicating the importance of understanding these effects in W7-X, and likely in ITER as well. The latest results on reflections/stray microwave (ECH) radiation, from the W7-X testing facility (MISTRAL) were presented. In the case of bolometers, it was found that shielding the detectors (foils) with very fine mesh was not sufficient to mitigate the apparent heating due to ECH radiation. Internal coating with appropriate ceramic material (absorbers) can further reduce the effects of microwaves within the instrument (reach the appropriate level). Many further tests are planned on key internal components, including cabling (e.g. MI cables). However, it is clear that the remaining issues are an accurate estimation of ECH loads and development of the protection methods from stray ECH powers for the diagnostic systems and in-vessel components of ITER. This HP item will remain.

2.4. HP#6: Assessment of the measurement requirements for plasma initiation and identification of potential gaps in planned measurement techniques

The early phase of plasma formation and control may require additional or special measurements

6. Publications

7. Plans for Future Meetings

Appendix 1
Publications by the ITPA TG

Background:

DIAG-4 Field test of a Capacitance Diaphragm Gauge as a Dust Monitor for ITER

Status: Continued

Purpose and goals:

DIAG-5 Field test of an activation probe

Status: NEW

Background