DIAG-10 Minimizing microwave absorption in vacuum windows (new)

|  |  |  |  |
| --- | --- | --- | --- |
| **TG priority:** High | **Start date:** 2016 | **Status:**  New | **Personnel exchange:**  No |
| **IO priority:** | **End date:** Select | **Motivation:** Engineering Design Support | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Device / Association** | **Contact Person** | **2016 TG Request** | **Activity (from JEX/JA spreadsheet)** | | | |
| **2016** | **2017** | **2018** | **2019** |
| Select W7-X | Laqua | Desirable |  |  |  |  |
| ITER / TU/e | Oosterbeek | Desirable |  |  |  |  |
| Select |  | Select |  |  |  |  |
| Select |  | Select |  |  |  |  |
| Select |  | Select |  |  |  |  |
| Select |  | Select |  |  |  |  |
| Select |  | Select |  |  |  |  |
| Select |  | Select |  |  |  |  |

\*1) Excellent facilities in University Stuttgart (Kasparek) and KIT excist. Access to these facilities via IPP?

**Purpose**

The aim of this work is to minimize microwave absorption in vacuum windows. The dominant source of power is expected to be from a gyrotron, either by exposure to a directed beam, or a cross polarized beam. The windows may be divided in two groups:

1. The window is used for microwave transmission.
2. The windows is used in visible and far-infrared AND microwave power must be reflected.

In the first group one wishes to minimize the microwave absorption coefficient of the window which is (at given frequency), given by the material properties of the window: loss tangent and permittivity. Depending on the location and geometry of the window arrangement it may also be possible to develop coatings or notch filters to selectively reduce the microwave power.

In the second group one could reflect a large fraction of the microwaves by metallic filters or by using Transparent Conductive Coatings (TCOs). Absorption of the filter or coating must be minimized. In addition it may still be required to minimize the window absorption coefficient of the window.

**The outcome of the work will be window assemblies that must be tested on microwave reflection, absorption and transmission**. Note that eventually the assemblies will have to be tested on all ITER specifications and loads such as vacuum compatibility, neutrons, thermal and mechanical stresses etc.

**In this JEX we ask for experimental facilities to test the window assemblies**. We in particular think of the MISTRAL facility at IPP-Greifswald. However, access to research labs with high quality resonator facilities such as KIT and Stuttgart would be very valuable in the research and development too.

**Plans for 2016**

* Development of a prototype window in group 1 and/or in group 2.
* Tests at low power and high power.

R&D and manufacture of the assemblies is foreseen to be carried out by IO, who may be assisted by external parties, e.g. TU/e or other universities / research institutes. Support by JEX is in particular asked for the tests.