

## Notes on the use cases for the Langmuirdiag CPO

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The Langmuirdiag CPO was devised to store Langmuir probe data. It can accommodate either fixed or reciprocating **probe holders** since all geometry-like settings are time dependent. The schema was devised to accommodate a wide variety of probe holder, single, double, triple or quintuple probe settings. Each probe holder will be an **occurrence** of this CPO and for the moment (v4.09a) it is limited to 3. On each probe holder there are two types of data : experimental measured data (e.g. floating potential, saturated current) and physics derived data (e.g. Te, ne, Mach number).

The experimental measured data type includes the elements :

- 'name' (any name to identify each probe head, particularly useful to cross-reference with the physics derived data – see 'source')
- 'direction' (is the probe head measuring co or counter the magnetic field direction)
- 'area' (although the probe *inclination* is not included, this area is the effective area that the expert has derived for that particular probe head/scenario)
- 'position' (time dependent position of the probe head)
- 'measure' (actual measured quantity; there will be fields for the value, abserror and relerror)

The physics derived data type includes the elements :

- 'source' (reference to the single or compound name(s) of the probes used to derive the physics quantity)
- 'position' (time dependent position where the measurement is known)
- 'measure' (measured physics quantity; there will be fields for the value, abserror and relerror)

### USE CASES

#### Triple probe :

- *First probe* measures Vf (use *Potential*) so the *Potential* element is size one.
- Although the other 2 probes are in series and thus one gets Isat and the other -Isat (typically), one could set
  - *Second probe* set for Jsat.....from which i might get ne.
  - *Third probe* set for Bias....but measuring the probe Potential. From here one gets Te with the ln(2) factor.

#### Double probe :

- *First probe* set to Jsat.....although it is really J\_collected....
- *Second probe* set to Bias....but in reality it is the dV set between the two probes...

#### Mach probe :

- *Two additional probes tied to Jsat*. Assume on a quintuple probe setting we have already 3 probes measuring Jsat but not for Mach number calculation. Then Jsat will become an array of 5. Three of them will have the direction set to 'both' (direction is meaningless) and the other two, one to 'co ' and the other to 'ct ' are the Mach probes.

#### Physics Quantities

Both Ne and Te can be set on each CPO (each probe holder), as vectors of the dimension we want, e.g. Te can be dim=1 in a 5-probe arrangement for instance.

include: utilities.xsd

lang\_measure

Structure for elementary Langmuir probe measurement

lang\_derived

Structure for physics quantities derived from Langmuir probe measurements

