Atomic data needs for studying of W sputtering in a high-density divertor plasmas

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W generation and transport study represents one of the hottest topics for next generation tokamaks with full metal plasma-facing components [1-4]. The existing W sputtering models are based on low density plasma sheath approximation [5-7], which might be not applicable for high density divertor plasmas expected in future machines, e.g. like ITER and DEMO.

In the given presentation we discuss results of recent full kinetic modelling of W sputtering and re-deposition in a high-density plasma sheath. The simulations indicate that

i. using atomic data based on the coronal approximation results at negligible prompt re-deposition of the W ions. This might have important consequences, as the corresponding net sputtering rates (i.e. gross sputtering rates minus prompts re-deposition) might become significant and cannot be neglected as it was assumed up to now.

ii. the coronal approximation is not sufficient for such study and multiple atomic transitions have to be included in the model. We identified the corresponding atomic processes which have to be included into the W sputtering models in a high density plasma.

Based on above-listed results, we present a list of W-relevant data necessary for realistic estimation of the W net sputtering rated in future fusion machines.

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