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Plasma Induced Sputtered Exosphere of Callisto

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A better understanding of particle release processes from the Gallilean satellites such as Callisto's surface is needed for planned exospheric and remote surface geochemical studies by the particle and plasma instruments of the PEP experiment on board of ESA's JUICE mission.
We study the interaction between the Jovian magnetosphere plasma and Callisto's surface with a hybrid model and applied a geochemical surface composition model for the input of the surface sputter release. Then we apply a 3-D exospheric model for studying the feasibility of exospheric measurements. We model energy and ejection angle distributions of the released particles from the surface, with the emission process determining the actual distribution functions. Our model follows the trajectory of each particle by numerical integration until the particle hits Callisto's surface again or escapes from the calculation domain. Using a large set of these trajectories, bulk parameters of the exospheric gas are derived, e.g., particle densities for various species.