Dynamics inside the Kirkwood Gaps

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The formation of the Kirkwood gaps at the mean motion resonances with Jupiter has long been a puzzle for the dynamicists.The tentative explanation based upon the collisions with terrestrial planets, which was proposed by Wisdom (1982), is now privileged but is still not complete. If it seems to account reasonably well for most of the gaps, it fails to explain fully the 2/1 gap and especially the difference between the 2/1 gap and the 3/2 family.

Our understanding of the dynamics inside the mean motion resonances has made much progress in the last decade and especially in the last five years with the discovery of the role played by the secular resonances and the secondary resonances.

We shall review these developments and discuss how they account for the fast depletion of most of the gaps. We shall also discuss the remaining challenge, i.e. the problem of the 2/1 and 3/2 resonances.