

## Recent developments of Pi2 research Recent developments of Pi2 research

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More than half a century after the discovery of Pi2 pulsations (ultra-low frequency waves with periods of 40 to 150 s), Pi2 research is still vigorous and evolving. Especially in the last decade, new results have provided supporting evidence for some Pi2 models, challenged earlier interpretations, and led to entirely new models. We have gone beyond the inner magnetosphere and have explored the outer magnetosphere, where Pi2 pulsations have been observed in unexpected places. The new Pi2 models cover virtually all magnetotail regions and their coupling, from the reconnection site via the lobes and plasma sheet to the ionosphere. In addition to understanding the Pi2 phenomenon in itself, it has also been important to study Pi2 pulsations in their role as transient manifestations of the coupling between the magnetosphere and the ionosphere. The transient Pi2 is an integral part of the substorm phenomenon, especially during substorm onset. Key questions about the workings of magnetospheric substorms are still awaiting answers, and research on Pi2 pulsations can help with those answers. In this talk, I will review recent developments of the ballooning-driven Pi2 model.

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