

# Separate Dynamic Formation, Evolution and Control of Electron Channel Transport Barriers and Ion Channel Barriers

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## Abstract

Simple dynamical models have been able to capture a remarkable amount of the dynamics of the transport barriers found in many devices[1,2,3], however, an open question which remains is the variable nature of the electron thermal transport channel. It has been found that occasionally an electron channel barrier will form with a standard (“ion channel”) barrier, while at other times the electron channel barrier does not form even when a strong “ion channel” barrier forms and finally, electron barriers may sometimes form without a concomitant ion barrier. By adding to the simple barrier model an evolution equation for electron fluctuations we investigate the interaction between the formation of the standard ion channel barrier and the somewhat less common electron channel barrier. Barrier formation in the electron channel is found to be even more sensitive to the alignment of the various gradients making up the sheared radial electric field than the ion barrier. Electron channel heat transport is found to significantly increase after the formation of the ion channel barrier but before the electron channel barrier is formed. This increased transport is important in the barrier evolution and therefore the profile evolutions in the system.

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