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Coronal Heating And Solar Wind Acceleration

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The energy transport in the electron-proton solar wind will be examined. An overview of the fundamental problems of solar wind heating and acceleration will be given. It will be followed by a detailed analysis of the solar wind energy budget, from the mid-chromosphere to the earthś orbit. Emphasis will be placed on the transition region and corona where most of the heating and acceleration takes place. Energy losses and energy input necessary to drive the solar wind will be discussed.

Observations leading to constraints on heating and acceleration requirements will be reviewed. Observations in transition region and corona pertain mostly to ions heavier than helium. The question whether and how these observations also constrain the background solar wind, can only be answered using model calculations investigating the coupling between these ions and the bulk of the solar wind flow. Therefore, examples of heavy ion expansion and energy considerations will be included, even though the heavy ions contribute only about 1% to the total solar wind ions. To study the expansion behavior of heavy ions is also important since more general conclusions about possible solar wind heating mechanisms are often drawn from their observed parameters.