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Letter to Editor

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How the *Tresino* Phase-Transition Heats the Solar Corona and Energizes the Solar Wind

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Article Info

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Abstract

This Letter describes the basic physics and primary role the *tresino* phase-transition plays in heating the solar corona and energizing the solar wind

Keywords: *Tresinos*, coronal heat, solar wind

Introduction

My previous Letter [1] dealt with the largest example of "how the *tresino* phase-transition impacts the dynamics of our galaxy"; yet, it overlooked the important early observations of the heating of the solar corona and the solar wind. Many solar scientists have questioned such observations by asking "how can the corona be so relatively hot while the solar surface is so relatively cold?" This Letter represents my suggestion about the basic physics responsible for such observations, once again the *tresino* phase-transition. Readers unfamiliar with *tresinos* might benefit from reading the *History and Introduction* section and the references of my previous Letter to the Editor [1] which dealt with the general question of how the *tresino* phase-transition impacts the dynamics of our galaxy. Here, I consider observations specific to the heating of the solar corona and the solar wind. Many solar scientists have wondered how the corona can be so relatively hot while the solar surface is so relatively cold. This Letter presents my understanding of the basic physics responsible for such observations - it is again the *tresino* phase-transition

Interpreting The AVRETT and LOESER Data Plot

I begin by introducing the *now-classic* data plot from the important solar-data paper of Avrett and Loeser [2]. Fig.1 is my annotated reproduction of their Figure 8. For now, focus on the temperature curve (T in red) and the turbulent velocity (V in green), both of which have clearly undergone some sort of phase-transformation, apparently originating close to the solar surface ≈2200 (km). The resolution (measurement accuracy) of the data points is not sufficient to resolve the exact location of the phase-transition, but it must be very close to the surface of the Sun as indicated in the annotated figure with the plasma density at ≈ $5 \times 10^{10}/cm^3$, noted as SOLAR EDGE in Fig.1.

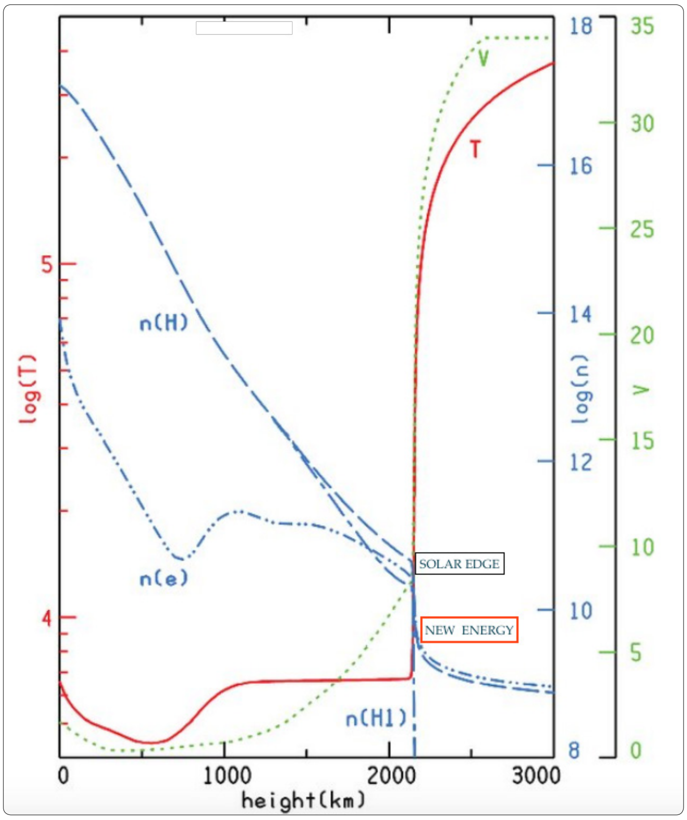

Figure 1. The Avrett and Loeser data plot of their model C7 variations with height of the temperature (K), turbulent velocity (km/s), total hydrogen density, neutral hydrogen density, and electron density (1/cm³)

Next, notice that the plasma evaporated from the solar surface must, of course, decrease as it expands but it will only be able to do so until it reaches the tresino phase-transition density previously found to be $1.6 \times 10^9/cm^3$ in [1] and noted as in NEW ENERGY Fig 1. In other words, at this density, *tresinos* are formed (as discussed in [1]) as two electrons pair-up to form tandem electron pairs before combining with a nearby proton and creating the stable, the bound-state composite, the *tresino* which releases its 3.7 keV of binding energy. Because there are so many such transitions taking place at the same time, the energy released is enormous rather like an explosion (as in Coronal Mass Ejections [1]).

This massive amount of additional energy resulting from *tresino* formation NEW ENERGY marked in red, is the explanation for the additional heat in the corona relative to the surface of the Sun. It is also the catalyst for solar winds (V in green). If this did not happen there would have been no heating of the corona (T in red) nor would there have been the solar-wind (V in green) as the *tresino* phase-transition clearly suggests.

It is clear why understanding the coronal heating and the solar wind have been difficult to understand. First, because the solar-physics community has not yet recognized *tresino physics*, and secondly because the *tresino* phase- transition occurs so very close to the solar surface making it difficult to resolve within such a small zone. Much has been made of the difficulty explaining coronal heating and considerable research has been devoted to it (as can be observed in the recent review by Hui Tian [3] concerning the solar transition region. Until the solar-physics community understands the process and implications of *tresino* phase-transitions, it will remain mysterious.

Closing Remarks

The results of this Letter along with those of my previous Letter [1] answer many vexing issues in solar-astrophysics. Others may yield, as well, if the results of the *tresino* phase-transitions are taken into account. One interesting example is that other *tresinos* such as deuterons instead of protons can play a role due to the fact that such *deuteron-tresinos* may produce some nuclear reactions further changing the composition of the evolving plasma. Of course, considering this may take some time until the physics has become well-understood and accepted by the solar-physics community

Dedication

I dedicate this Letter to my late mentor, collaborator, and friend, Dr. John R. Reitz, without whose efforts this work would not have become possible.

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