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## **"A thermal noise's analysis in biological matter"**

### **Abstract**

The biological effects of electromagnetic fields of very low intensity (two or three orders of magnitude lower than  $kT$ ), found by many researchers, and of low frequency magnetic fields, whose energy is ten orders of magnitude lower than  $kT$ , are one of the most important topics of bioelectromagnetism. The physical nature of such phenomena is still unclear.

In 1990, the physicist Adair tried to solve this problem by suggesting that no biological effect is possible. The paradigm is the constraint of thermal limits, and it is based on the analysis of Johnson and Nyquist noise and the hypothesis of noise electric field. This point of view became the prevailing one in the well known APS statement of 1995. Nowadays this paradigm is the basic problem for those scientists who research about bioelectromagnetism.

The authors show, through a detailed physical analysis of the thermal noise's theory, that Adair's paradigm depends on some misconceptions, that could affect its validity and the results of Adair's analysis. Consequently, they propose another path to interpret this kind of phenomena inside the biological matter.

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