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How Terahertz Waves Tear Apart DNA

*By Emerging Technology from the
arXivarchive page*

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But what of the health effects of terahertz waves? At first glance, it's easy to dismiss any notion that they can be

damaging. Terahertz photons are not energetic enough to break chemical bonds or ionise atoms or molecules, the chief reasons why higher energy photons such as x-rays and UV rays are so bad for us. But could there be another mechanism at work?

The evidence that terahertz radiation damages biological systems is mixed. “Some studies reported significant genetic damage while others,

although similar, showed none,” say Boian Alexandrov at the Center for Nonlinear Studies at Los Alamos National Laboratory in New Mexico and a few buddies. Now these guys think they know why.

Alexandrov and co have created a model to investigate how THz fields interact with double-stranded DNA and what they’ve found is remarkable.

They say that although the forces generated are tiny,

resonant effects allow THz waves to unzip double-stranded DNA, creating bubbles in the double strand that could significantly interfere with processes such as gene expression and DNA replication. That's a jaw dropping conclusion.

And it also explains why the evidence has been so hard to garner. Ordinary resonant effects are not powerful enough to do do this kind of damage

but nonlinear resonances can. These nonlinear instabilities are much less likely to form which explains why the character of THz genotoxic effects are probabilistic rather than deterministic, say the team.

This should set the cat among the pigeons. Of course, terahertz waves are a natural part of environment, just like visible and infrared light. But a new generation of cameras are

set to appear that not only record terahertz waves but also bombard us with them. And if our exposure is set to increase, the question that urgently needs answering is what level of terahertz exposure is safe.

Ref: arxiv.org/abs/0910.5294:

DNA Breathing Dynamics in the Presence of a Terahertz Field

