

Plasma loops may explain solar puzzle

THE mystery of the sun's super-hot atmosphere may lie in giant loops of plasma that are mostly invisible to today's solar probes.

Normally, the further you go from a heat source, the cooler it gets. Not so with the sun. Its surface is a sizzling 6000°C, but the corona, despite being further from the sun's nuclear core, reaches more than a million degrees.

Physicists aim to solve this mystery by mapping the coronal loops: streams of hot, glowing plasma that follow magnetic field lines that rise from the sun's surface and fall back in. Since 2010, NASA's Solar Dynamics Observatory has been providing pictures of these loops. The images show ultraviolet radiation that is emitted by ionised elements, such as iron, in the plasma.

Now, Gregory Fleishman at the New Jersey Institute of Technology in Newark and his colleagues have shown that these ions aren't distributed uniformly throughout a loop. The researchers analysed the properties of the electric current that flows through the plasma along the loops, as well as its effect on the ions.

They found that regions where the electric current is positive – meaning it is flowing out of the sun's surface – act as ion traps, creating a high density of ions of heavy elements there, while depleting them elsewhere in the loop (arxiv.org/abs/1803.02851).

The implication is that the loops may not be emitting UV light from their entire length, but rather only from regions where the ions are found in high concentration. This could mean we are missing part of the picture, says team member Sophie Musset at the University of Minnesota in Minneapolis.

"Maybe there are some loops which do not emit in ultraviolet," she says. If so, these wouldn't show up in UV images. This will have to be accounted for in models that try to explain the extreme temperatures of the corona, says Musset. Anil Ananthaswamy ■



DAVE AND LES JACOBS/PLANIPICTURE

You really do put on weight in a relationship

FINDING love isn't great for your waistline. A large study has found that even though couples tend to have healthier lifestyles than single people, this doesn't stop them from piling on the pounds.

Stephanie Schoeppe of Central Queensland University in Australia and her colleagues have analysed a decade of survey data from more than 15,000 volunteers. Each person had answered questions about lifestyle choices, such as how much fast food they ate, and how much television they watched.

The team found that couples and singles seem to do the same amount of physical activity, and watch similar amounts of television, even accounting for variables such as age, sex, employment status and level of education.

Generally, people in relationships seemed to make other healthier lifestyle choices, says Schoeppe. Couples ate more fruit and vegetables and less fast food, they drank less alcohol, and they smoked less too (*PLoS One*, doi.org/gc3szg).

Other studies have shown that

if couples are happy with their relationship, they are more likely to want to live healthier lifestyles because they want their relationship to last longer too, says Jerica Berge at the University of Minnesota Medical School.

But despite this, people in relationships were more likely to be overweight. "It could be that couples are eating more of all food types together – both

"When you're married, your social behaviours tend to revolve around occasions that involve eating"

healthy fruits and vegetables, and desserts, or rich foods, which increases the likelihood of being overweight," says Berge. "This may be because social behaviour in marriage commonly revolves around eating occasions."

"When couples don't need to look attractive and slim to attract a partner, they may feel more comfortable in eating more, or eating more foods high in fat and sugar," says Schoeppe.

"How long you've been in the relationship for probably

matters," says Anja Heilmann at University College London. Past research has found that couples are more likely to be overweight or obese if they are married or have been living together for more than two years.

Having kids may also have an effect. "When couples have children in the household, they tend to eat the children's leftovers or snacks," Schoeppe says.

Relationship status seems to affect men and women differently. Heilmann has shown that single men who have divorced or separated from a partner are more than twice as likely to drink heavily as men still in relationships. But there is no such link between divorce and alcohol in women.

Schoeppe hopes that understanding how relationship status affects health might help health practitioners give better advice to people who want to live more healthily. "When we look at interventions, we traditionally look at education, age and gender, but we less often look at relationship status," she says. "Families and relationships play an important role in lifestyle choices. You're a closed unit and can easily influence each other – so we have to consider that too." Jessica Hamzelou ■