NEWS

Research led by PPPL provides reassurance that heat flux will be manageable in ITER

By John Greenwald
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(Photo by ITER.)

Fish-eye view of ITER construction with tokamak site in center.

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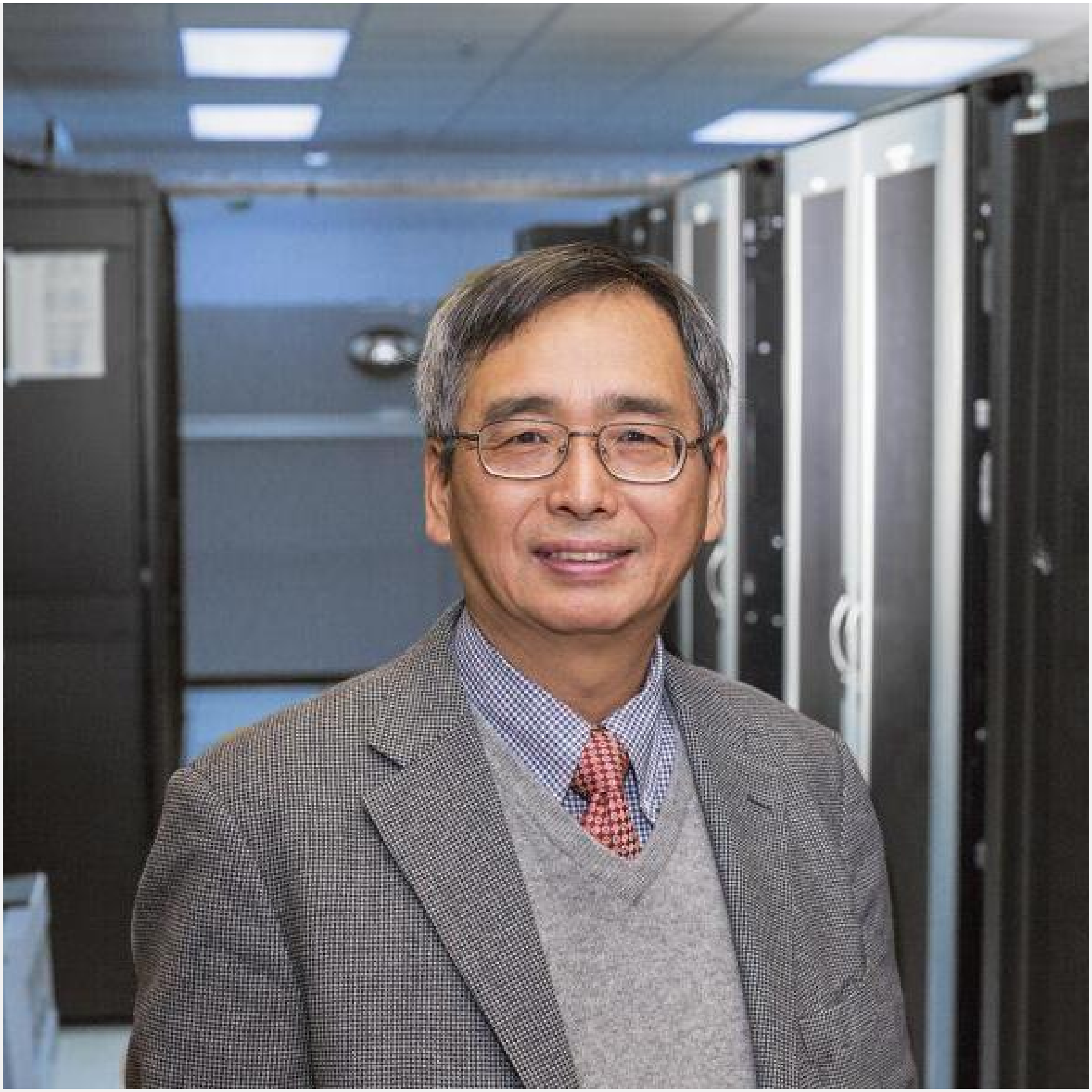

(Photo by Elle Starkman/PPPL Office of Communications)

Physicist C.S. Chang

A major issue facing ITER, the international tokamak under construction in France that will be the first magnetic fusion device to produce net energy, is whether the crucial divertor plates that will exhaust waste heat from the device can withstand the high heat flux, or load, that will strike them. Alarming projections extrapolated from existing tokamaks suggest that the heat flux could be so narrow and concentrated as to damage the tungsten divertor plates in the seven-story, 23,000 ton tokamak and require frequent and costly repairs. This flux could be comparable to the heat load experienced by spacecraft re-entering Earth's atmosphere.

New findings of an international team led by physicist C.S. Chang of the U.S. Department of Energy's (DOE) Princeton Plasma Physics Laboratory (PPPL) paint a more positive picture. Results of the collaboration, which has spent two years simulating the heat flux, indicate that the width could be well within the capacity of the divertor plates to tolerate.

Good news for ITER

"This could be very good news for ITER," Chang said of the findings, published in August in the journal Nuclear Fusion. "This indicates that ITER can produce 10 times more power than it will take to heat the plasma, as planned, without damaging the divertor plates prematurely."

At ITER, spokesperson Laban Coblentz, said the simulations were of great interest and highly relevant to the ITER project. He said ITER would be keen to see experimental benchmarking, performed for example by the Joint European Torus (JET) at the Culham Centre for Fusion Energy in the United Kingdom, to strengthen confidence in the simulation results.