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Putting all dieters to shame the red giant stars of our galaxy lose many times the entire mass of the Earth, every year.

Unlike Hollywood starlets, they have not previously revealed their weight-loss secrets, posing an enigma for scientists, until this breakthrough study by the University of Sydney, to be published in *Nature* on 12 April.

The solution of the mass loss problem has profound implications across astronomy and beyond.

“The winds that stream from the upper atmosphere of the red giant stars are responsible for removing the massive amounts of matter,” said lead author Barnaby Norris, a PhD student from the University’s Faculty of Science.

Using a state-of-the-art telescope at one of the world’s leading observatories in Northern Chile, the research team created images of the faint starlight glinting off an unexpected halo of dust grains around the red stars.

“The grains that we have discovered here will come as a real shock to the accepted wisdom in the field. They are both much larger and much closer to the stellar surface than anyone expected.”

This could be a critical new piece in the puzzle of how these old, dying stars manage to drive such powerful winds, Norris explained. They are much larger and much closer to the stellar surface than had been expected.

“These myriad specks of dust seem entirely unimportant individually, but each one can act as a minute solar sail catching the rays of light from the star and adding its infinitesimal push to the gas, creating the wind,” added Professor Peter Tuthill, director of the Sydney Institute for Astronomy at the University and co-author of the research.

“It is remarkable to think that grains as fine as particles in smoke might be responsible for a moving a mass amounting to more than the entire earth each year.”

“xxxHalf?? of the chemical elements which we find in our galaxy came from the winds driven from dying red giants,” said Barnaby.

“That means the Earth and everybody living on it are quite literally made of the stardust we are studying with our new techniques.

“Hopefully our findings will help to illuminate a key step in the grand cycle as matter is expelled from stars into the galaxy only to seed new generations of stellar and planetary birth.”

The ultimate fate of the star itself can hinge upon the efficiency of the wind. The mass removed by the wind can bring a somewhat heavier star below the critical threshold required to fuel a cataclysmic supernova explosion, defusing the bomb and allowing it to fade away as a white dwarf star.

Astronomers from Macquarie University, Paris Observatory and The University of Manchester also contributed to the research.

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