"I like to walk in the footsteps of people who did the impossible"

Physicist and environmentalist Melanie Windridge summited Everest to show how science fuels adventure

WORDS **ELLEN TOUT** PHOTOGRAPHS **ALUN CALLENDER**

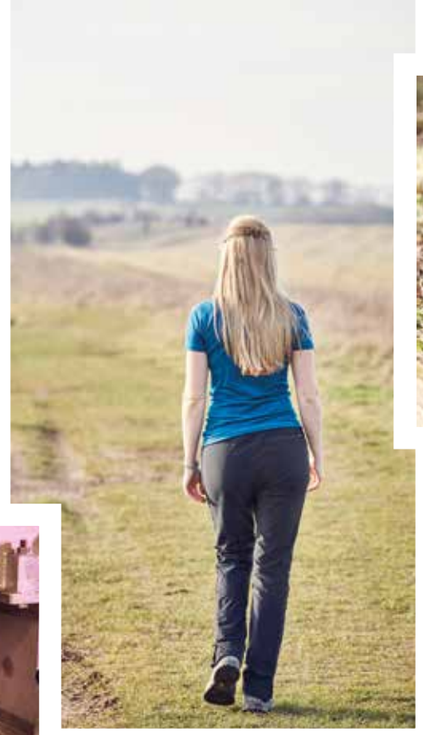
ABOVE AND RIGHT Melanie hopes to create an abundant, safe and cost-effective source of energy

BELOW Passionate about her work and its objective, Melanie communicates with colleagues, investors, the public and students

"Because of my passion for the environment – mountains, snow, glaciers, the Arctic – I want to contribute to something bigger. This work gives me real purpose"

RIGHT Melanie walks on The Ridgeway in Oxfordshire. Being outdoors – trekking, skiing and running – helps her unwind

LEFT AND BELOW The tokamak device at Tokamak Energy, a leading laboratory in fusion, aims to heat plasma to temperatures of more than 100 million degrees celsius to generate energy



"I like the big picture. To do something that is inspiring and will one day change the world is a privilege"

Melanie Windridge loved science and experiments at school. 'I've always been curious and liked playing with objects,' she remembers. 'Physics was my favourite subject, which was rather unusual at a girls' school. By the time I did my GCSEs, I knew that I wanted to study physics at university.' She spent a year of her degree course studying in France and later, during two years of travelling, Melanie fostered her passion for exploration and the outdoors, too. 'While travelling, I spent time in the mountains and got my first taste of walking at altitude on the Inca Trail,' she says. 'Being in nature, I began to see the effects of climate change – like coral bleaching in Thailand and glaciers retreating in the Himalayas.' Unsure of where her physics degree would take her, Melanie began researching fusion – a way of creating clean, green energy.

During her PhD in fusion energy, Melanie led university visitors' tours and, one day, she was asked to fill in for another expert and give a talk – something she now does regularly. 'I was terrified!' she says. 'I felt exposed. It was not natural for me. But, because I care about the subject, I've learned to see it as just having a conversation about my work. If you'd told me I'd do a TEDx Talk and speak publicly all the time, I wouldn't have believed you. It's amazing when people provide feedback. You don't get that reward unless you open up and give of yourself.'

Why is she so passionate about fusion? 'Fusion is like building a miniature sun on earth. It's the reaction that powers the sun and stars all the time,' she explains. 'As scientists, we want to replicate those conditions to create clean, abundant energy with no greenhouse gases. I believe that the energy problem is fundamental to our civilisation. Because of my passion for the environment – the mountains, snow, glaciers, the Arctic – I want change to happen and to contribute to something bigger. This work gives me a real purpose.'

A story about saving the planet

Melanie is a freelance physicist and science communicator, which means that she explains science-related topics to non-experts, but she had expected to pursue a more traditional role. 'When I didn't find work in academia, I had a crisis of confidence and identity. I always thought that was why I was studying physics and that was the way my life would go. It was tough to find my path,' she says. But, sharing her work through talks, outreach in schools for The Institute of Physics and a blog, which later became a book, took her on a different journey. 'Someone at Tokamak Energy, a leading laboratory in fusion, for which I've worked for five years, spotted my work and decided they needed someone who can tell the fusion story to the world,' she explains. 'It was tiny then, but perfect for me because I like the big picture. To do something that is inspiring and will one day change the world is a privilege.

'I juggle my time between work and personal projects – books, talks and trips. I'm lucky that I'm able to work >>>

LEFT Melanie spent a year training and researching how science supports mountain climbers

BELOW LEFT Melanie's boots. She's fascinated by how the chemistry of clothing protects from the elements

"'I can do it' became the mantra I plodded along to. There was no question in my mind... I had faith"

LEFT Spending seven weeks on Everest helped Melanie acclimatise and train at its different bases

RIGHT Her Everest challenge kit included thermals, boots, a down suit, helmet and ice axe

"Suddenly, the sun came up and it was incredible. I was able to enjoy sunrise at the top of the world. My overwhelming emotion was relief"

>>> while going on expeditions that I love, and it's all science!' One such exploration took Melanie to see the aurora (Northern Lights). 'Both fusion and the aurora involve plasma so, as a plasma physicist, I wanted to see this spectacular, natural plasma phenomenon. I took an Arctic science course and *had* to go and see this intense movement in the sky!' Her experience inspired Melanie's book, *Aurora: In Search Of The Northern Lights* (William Collins, £12.99). 'I thought, "What must it have been like for indigenous populations and explorers, seeing this marvel in the sky before science knew what it was?" I realised I could write about the science, but weave in landscapes, people and travel. Before I even had a book deal, I had the confidence to say, "I'm going to do this insane thing; I'm going to commit time and money to this."'

A pioneering mind

Extraordinary things have always fascinated Melanie. 'Everest, the aurora, fusion – they seem unconnected, but I think they're linked by the notion of impossible things,' she says. 'People say fusion is impossible. I like to challenge myself and to walk in the footsteps of explorers; of the people who did the impossible. I have a strange fascination with things that others think are impossible. History has shown us that just because something is impossible now, it doesn't mean that it will always be impossible. We don't know when fusion is going to happen – it's science; it's an exploration.'

Melanie is vice president of the Alpine Club, the world's first mountaineering club, which ignited her dream to climb Everest. 'Before joining, Everest was this crazy, big mountain that I thought you'd have to have a death wish to climb – not anything I'd ever do!' But, after some research, she realised the role science played in the first successful summit in 1953. 'People talk about the strength of the human spirit but not the science. As a scientist, I found that interesting,' she says. 'What's hard about Everest is the altitude. It's so high that you're literally dying; your body is shutting down. It took a scientist to identify how to overcome that. I read loads about it and realised that, actually, I could probably climb Everest. Once I had that thought, I couldn't walk away from it. I didn't want to spend the rest of my life knowing that I didn't take my opportunity.'

Melanie spent more than a year researching and training, then seven weeks preparing on the mountain and, in March 2018, she reached the summit. 'I had been walking for nine hours through the night, but I was focused. I reached the top first in my group! Suddenly, the sun came up and it was incredible. I was able to enjoy sunrise at the top of the world. My overwhelming emotion was relief.' Ten per cent of climbers to conquer Everest have been women. Did she consider turning back at any point? 'The altitude makes you feel like you have a permanent hangover. It was hard, but I wasn't going to give up. To keep going, I sang in my head, "I can do it." That became the mantra I plodded along to. There was no question in my mind that I would do it. I had faith.'

Paving the way for women

During the expedition, Melanie created a series of YouTube videos to highlight how science improves safety and performance on the mountain. 'I wanted to bring the science to life in a different context; to show how science is relevant and enables us to do this impossible challenge – altitude, acclimatising, the body, oxygen, communication, rescue, the chemistry of my kit and clothing... I'm writing a book about it which I hope will inspire people, particularly women and girls.

'Not only am I a female in science, which is male-dominated, but also in adventure. I want girls to see that they can do exciting things and that there are opportunities for them,' she says. 'I think the perception is that you've got to be super smart or geeky to be a scientist, but that's not true. It's about finding your niche.' Melanie is keen to encourage more women to pursue scientific careers. 'It makes me sad to think that people believe "that's not for me because I'm not a man" or "I'm not smart enough". I've had girls ask me at talks whether pursuing a career in science is OK. Girls need to be able to look at professions like mine and see where they fit.'

When Melanie isn't climbing mountains, nature plays an important part in her life in Buckinghamshire. 'I like to notice and experience things: to see blades of grass and hear stones under my boots,' she says. 'While climbing, I realised that we don't spend enough time thinking nothing and doing nothing. When you are *forced* to – sitting in a tent without anything to read, or walking for hours – you're in your own world and you can reflect. Being in nature is my time to think, detach, let my mind go and allow my eyes to focus on the distance.'

melaniewindridge.co.uk; @m_windridge; tokamakenergy.co.uk; bit.ly/EverestVids

PHOTOGRAPHS: ROBERT HOLLINGWORTH; BRUNO DUPETY