

Theoretical Man: A Caltech Particle Physicist Comes to Iron Man's Aid

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Tony Stark, played by Robert Downey Jr., uses brute force rather than a physicist's skills to put the finishing touches on his new power source. [Credit: Paramount Pictures]

(PhysOrg.com) -- When Iron Man can't do the job, who ya gonna call? Well, how about Caltech theoretical physicist Mark Wise? In Iron Man 2, the blockbuster science-fiction film based on the comic book superhero, Tony Stark, aka Iron Man, is slowly dying from the palladium that gives him superhuman strength. He must come up with a new element to power the portable nuclear reactor attached to his chest so that he can defeat the evil Russian physicist Ivan Vanko. But how?

Enter Wise. Back in February 2009, Caltech's McCone Professor of High Energy Physics was working on theoretical models on the nature of matter in the universe when he got an email from the Science and Entertainment Exchange. That's a program of the National Academy of Sciences that hooks up scientists with Tinseltown types when Hollywood

folk require quick answers to science questions. In the case of Iron Man 2, the film's producers wanted advice on how their superhero could realistically recharge his nuclear-powered chest protector.

Although Wise is not an experimentalist, his [theoretical models](#) that contain exotic forms of matter are currently being tested at Europe's new particle accelerator, the [Large Hadron Collider](#), which sends proton beams smashing into each other to investigate fundamental questions of physics. So volunteering his expertise did not seem a stretch. He and one of his graduate students, Tim Dulaney, went to Marvel Studios in Manhattan Beach to give the filmmakers a crash course in elementary particle physics.

Wise and Dulaney met for two hours with a group of producers as well as the film's screenwriter. The filmmakers wanted input on a scene in which Stark finds clues hidden in a model of buildings that his father used long ago to design a science theme park. "We discussed using the buildings to represent electrons in an atom," Wise says. In a later scene, in which Stark produces the mystery element, the filmmakers sought Wise and Dulaney's advice on what type of apparatus you'd need to build if you wanted to discover a new element.

"I don't remember how much of our input was used, and it's hard to remember who contributed what," Wise says, "but I enjoyed the discussion. In the movie, they're not too specific on what they're building. Being vague is to their credit."

The end result is a scene in which Stark, played by Robert Downey Jr.—who might himself be considered an exotic form of matter—constructs a particle accelerator in a few hours, using parts that are conveniently stored underneath his living room floor. The apparatus is completed when Downey—sweating, straining, and using a massive pipe wrench—unleashes a particle beam that destroys everything in its

path before it locks on and recharges his power pack.

Wise was invited back to the studio to view the completed scenes and to meet the director, Jon Favreau. About a week after the film opened in early May, Wise went to see it.

"I actually liked it a lot," he said. "But I'm a huge fan of these kinds of movies."

Provided by California Institute of Technology

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