

# **The Dark Knight Rises - and crashes: Students discover Batman's cape gliding technique is fatally flawed**

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(Phys.org) -- Batman returns to cinemas for the Dark Knight Rises this month (July 20) - but unless he has invested in a new cape, he may fall into some trouble.

Physics students have calculated that the superhero's method of using his cape to glide from tall buildings - as seen in Christopher Nolan's Batman Begins - would result in him hitting the ground at life-threateningly high speeds.

In the film, the caped crusader - played by Christian Bale - wears a cape which becomes rigid when a current is passed through it, allowing him to glide over Gotham City in a similar manner to a base jumper in a wingsuit.

Four MPhys students from the University of Leicester have published a paper claiming that although this method of gliding would be possible, Batman would be likely to suffer a fatal collision when he reached the ground.

Due to the high speeds he would be travelling, his impact with the ground would be equivalent to him being struck by a car travelling at 50 miles per hour.

David Marshall, Tom Hands, Ian Griffiths and Gareth Douglas found

that the [wingspan](#) of Batman's cape - at 4.7 metres - is around half that used by a hang glider.

If Batman jumped from a building 150 metres high, he could glide a distance of around 350 metres - but the problem arises as Batman's velocity increases during his descent.

His velocity would initially rise to around 68 miles per hour, before reaching a steady 50 miles per hour as he gets down to ground level - a speed too fast for him to land safely.

The group concluded that DC Comics' superhero should consider taking a [parachute](#) with him if he wanted to stay in one piece.

David Marshall, 22, said: "If Batman wanted to survive the flight, he would definitely need a bigger cape. Or if he preferred to keep his style intact he could opt for using active propulsion, such as jets to keep himself aloft.

"If he really wanted to stick with tradition he could follow the method of Gary Connery, who recently became the first person to glide to the ground from a helicopter using only a wingsuit, although he only made it down safely using a large number of cardboard boxes."

The paper, entitled 'Trajectory of a falling [Batman](#)' was published in this year's University of Leicester Journal of Special Physics Topics.

The journal is published every year, and features original short papers written by students in the final year of their four-year Master of Physics degree.

David added: "This was an enjoyable module to be involved with, but it was also a lot harder work than it sounds. Each fortnight we had to write

our own papers, review the papers of other groups, make corrections to our reviewed papers and put together an editorial board meeting to discuss the outcomes for the papers currently in the process of review.

"Choosing creative projects did make the task a little easier and more interesting. I believe the module is worthwhile, as learning how to approach new problems is an important part of being a physicist."

Course leader Dr Mervyn Roy, a lecturer at the University's Department of Physics and Astronomy, said: "A lot of the papers published in the Journal are on subjects that are amusing, topical, or a bit off-the-wall. Our fourth years are nothing if not creative! But, to be a research physicist - in industry or academia - you need to show some imagination, to think outside the box, and this is certainly something that the module allows our students to practice.

"Most of our masters students hope to go on to careers in research where a lot of their time will be taken up with scientific publishing - writing and submitting papers, and writing and responding to referee reports.

"This is another area where the module really helps. Because Physics Special Topics is run exactly like a professional journal, the students get the chance to develop all the skills they will need when dealing with high profile journals like Nature or Science later on in life."

**More information:** You can read the full paper here: [physics.le.ac.uk/journals/inde ... article/view/484/289](https://physics.le.ac.uk/journals/index.php/article/view/484/289)

The latest issue of the University of Leicester's Journal of Physics Special Topics here: [physics.le.ac.uk/journals/inde ... hp/pst/issue/current](https://physics.le.ac.uk/journals/index.php/pst/issue/current)

Provided by University of Leicester

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