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Science Section

A Tale of Power and Intrigue in the Lab, Based on Real Life



Left, Associated Press; right, Rodney White/Iowa City Press Citizen

Gang Lu, left, shot five people and himself at the University of Iowa in 1991, including Miya Sonya Rodolfo-Sioson, right.

By **DENNIS OVERBYE**

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On Nov. 1, 1991, outraged that his doctoral thesis had been passed over for an academic prize, a young physicist at the [University of Iowa](#) named Gang Lu opened fire at a physics department meeting. He killed five people and paralyzed another before taking his own life.



Matthew Margolin/Myriad Pictures

Lloyd Suh and Ye Liu, actors in the movie "Dark Matter," which is based on the shootings.

The shootings devastated Iowa City and shocked a nation not normally used to thinking of physics as a life-and-death pursuit. Now they have been transformed into a celluloid nightmare for the rest of us.

At the [Sundance Film Festival](#) in January, “Dark Matter,” a fictional account inspired by the shootings, won the Alfred P. Sloan Prize for the best feature film dealing with science or technology — “not a genre that attracts a lot of people to work on,” in the words of Brian Greene, a physicist, mathematician and author from [Columbia University](#) who was on the panel of judges.

But the prize, not to mention a bloody ending reminiscent of “Bonnie and Clyde” or “The Wild Bunch,” may give a boost to its coming appearances on the film festival circuit. The movie, directed by Chen Shi-Zheng, written by Billy Shebar and starring [Meryl Streep](#) and [Aidan Quinn](#), follows the adventures of a graduate student from Beijing, Liu Xing, who arrives at a fictional Valley State University to study under a famous cosmologist, Jacob Reiser (played by Mr. Quinn). Ms. Streep plays a philanthropist and patron of the university, who is an aficionado of Chinese culture who befriends Chinese students.

The professor is first impressed with Liu’s brilliance and diligence but turns against him when he begins to pursue a project that goes against his mentor’s favorite theory. He pulls the rug out from Liu’s doctoral thesis, meaning that the student will have to leave school and seek a job without his degree. Instead Liu, played by Ye Liu, gets a gun.

The title refers to the invisible clouds of something that seem to swaddle the galaxies, and to provide the scaffolding for the structure and evolution of the visible universe. In the early ’90s, when the movie is set, the existence and extent and nature of this dark stuff were the hottest questions in cosmology, and the arguments, jargon

and even the graphs brandished by the movie's protagonists seem ripped from popular science writing of the time.

But the movie isn't really about science.

As Mr. Chen, the director, said, "It's about power, in a way." That would be the nearly feudalistic power that a graduate adviser has over his student, who after 16 or more years sitting in a classroom listening and regurgitating information must now change gears and learn how to produce original research. That grueling process has been the crucible in which new scientists are made ever since Plato mentored Aristotle, and although it rarely leads to murder [adjoining article], it can often lead to disaffection, strife and lifelong feuds.

"The film did a really good job of capturing the atmosphere of a research lab," Dr. Greene said.

"Graduate students are like apprentices," said Michael Turner, a cosmologist at the [University of Chicago](#). "It's from another era. It's something we don't do well anymore, hand-crafted training."

Advisers, he noted, write recommendations, decide when it is time for a student to defend his or her thesis and divvy up credit for the work that gets done together. Astronomers still argue about whether Jocelyn Burnell-Bell, who discovered the first pulsar while a graduate student at [Cambridge University](#) in England, should have shared in the subsequent [Nobel Prize](#) given to her adviser, Antony Hewish.

Janet D. Stemwedel, a philosopher at San Jose State University, recently wrote on her blog, [Adventures in Ethics and Science](#), "It's hard to understand just how powerless you can feel as a graduate student unless you have been a graduate student."

Dr. Turner said: "The bond between student and adviser is almost like getting married. You're going to be working and interacting with this person the rest of your life."

As the movie makes clear, the passage from student to junior colleague is only heightened in ambiguity and tension when you are thousands of miles from home and hardly speak the language.

James Dickerson, a physicist at [Vanderbilt University](#) who leads a committee on minorities in physics for the American Physical Society, said Asian students were often marginalized because of a perception, which he called “unstated racism,” that they are exceptionally smart and are there to work 24 hours a day, 7 days a week. As a result they wind up as cogs in the research machine and remain isolated from the rest of the community and the culture.

“It’s something not widely discussed in the physics community,” Dr. Dickerson said.

Shing-Tung Yau, a [Harvard](#) mathematics professor and mentor of many young mathematicians, said China’s one-child policy has added to the pressure on students.

“The Chinese family in general has high expectation on their children,” he said in an e-mail message. “When they realize that they cannot achieve it, they get very upset, especially the whole family have been telling their friends about him or her.”

“They also compete among themselves severely,” Dr. Yau added. “I observed that within my students.”

Dr. Lu, the Iowa gunman, was part of a wave of Chinese students recruited to come to Iowa to study plasma physics in the 1980s, when China was opening up to the West again after the Cultural Revolution.

Gerald Payne, a physics professor at Iowa then and now, said: “The selection process was very rigorous. We had exceptional students from China.”

By all accounts, however, Dr. Lu was troubled. Dr. Payne described him as very competitive and a loner, not good at socializing or

expressing himself. He had isolated himself from other Chinese students and was living alone.

Mr. Chen, the director, said that he had met Dr. Lu's sister in Beijing and that she had described him as someone who knew how to get good grades and go to the top, but who had "no living skill."

Dr. Lu got his doctorate in the spring of 1991, but he failed to win the university's \$2,500 Spriesterbach Prize. The university gave it instead to his former roommate and perceived rival, Linhua Shan, and Dr. Lu complained to university officials.

Dr. Payne said that Dr. Lu's adviser, Christoph K. Goertz, and the physics chairman, Dwight R. Nicholson, both of whom were killed, along with Dr. Shan, had been trying to help him, and had written him strong letters of recommendation for his job search. "People were addressing the issue; he was just being unrealistic in his demands," he said. "His adviser was one of the nicest people I've ever known. It was really sad."

Mr. Chen, who is best known for directing operas, was a graduate student at [New York University](#) at the time. He recalled being puzzled by the shootings and the response. One Chinese language newspaper, he said, ran a front-page apology for the shootings, in language its intended recipients couldn't read. At the same time he saw a screen saver from a Chinese student association that read "Long live Gang Lu."

He said: "They held him as a hero. That really shocked me."

The story resonated with Mr. Chen's own experiences and that of friends who came to the United States with huge expectations and found themselves lost or on the wrong end of a power struggle with their mentors, and who either went back home or, in the case of one good friend, simply disappeared.

He said: “A lot of people came in late ’80s. They never found a balance between the idea of America and the America they experienced.”

The resulting movie is part autobiographical and deliberately steers away from a direct replication of Gang Lu’s story, partly out of respect for the families of the victims. One small change was to switch the action from plasma physics to cosmology, a jazzier subject whose abiding theme, dark matter, had a plethora of metaphorical meanings to Mr. Chen, among them a difference between East and West.

“In Chinese culture,” he explained, “the most profound world is intangible and invisible. Here, everything has to be proven, material.”

A more significant change was in the character of the protagonist. The character Liu Xing seems sunnier and more connected to the people around him, even to the extent of courting a local waitress, than the moody and isolated Gang Lu. Much of the onus of being the bad guy shifts to the adviser, who takes advantage of his student and then betrays him.

The ending is abrupt and, indeed, dark. A review on Variety magazine’s Web site complained that the violence came with little foreshadowing.

Indeed, Dr. Greene said that some of the Sundance judges thought the movie worked fine without the ending. “We don’t want to put out the idea that homicidal graduate students are a dime a dozen,” he said.

Mr. Chen said he wanted to tell the story of Liu Xing’s disillusionment without pointing a finger at who did what. Dr. Payne said Iowans worried that the movie would be taken as literal truth, leaving the impression that professors there had taken advantage of their graduate students. “I don’t see that perception in my graduate students,” he said. “When they come back they have good memories.”

“When these things happen, people always look for a reason,” he said, but added that Iowa had always treated its graduate students well, as colleagues and not indentured servants.

Nevertheless, he said, the university has tried to have more frequent and more regular get-togethers, like pizza parties and meetings. “Some of those things you should be doing anyway; it’s just part of a good education,” Dr. Payne said. “Some of that is a result of the shootings.”

“We didn’t ignore the shootings,” he said. “You get past those things, but you don’t forget them.”