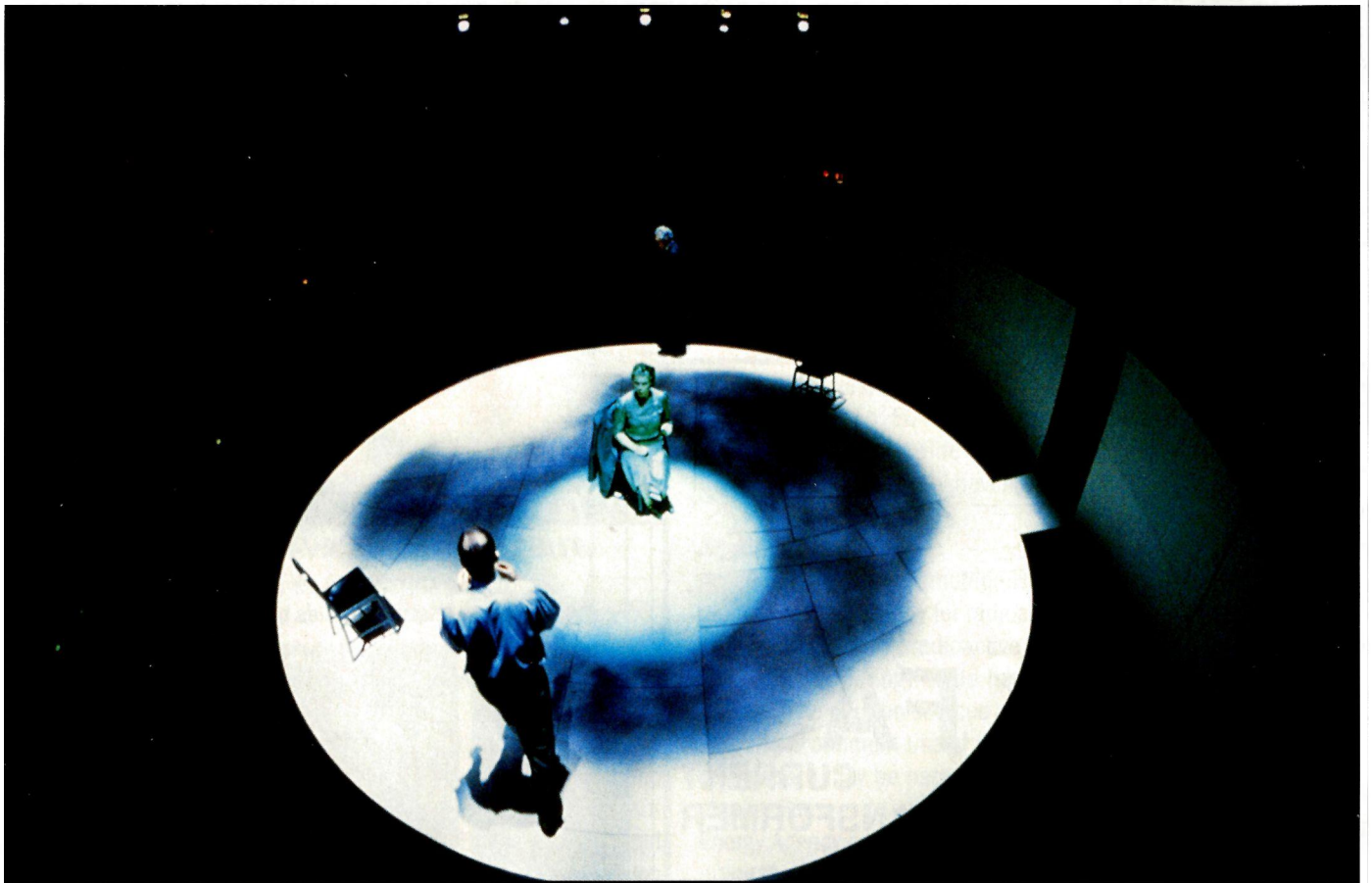


# Copenhagen interpretation

Now playing to full houses in London's theatreland is *Copenhagen*, a fascinating new play that imagines a dialogue between the ghosts of quantum pioneers Niels Bohr and Werner Heisenberg.



*Copenhagen* in London - physics theatre with Matthew Marsh as Werner Heisenberg (foreground), Sara Kestelman as Margrethe Bohr (seated) and David Burke as Niels Bohr (photo Conrad Blakemore).

The play *Copenhagen* shows that physics, in the hands of talented British playwright and author Michael Frayn, can be entertainment.

However, few theatregoers are pulled to the box office by the promise of an evening about physics: it is Frayn's name that packs them in. With an International Emmy Award in 1990, several Best Comedy Awards and Play of the Year, audiences know that he delivers the goods.

In the 1998 harvest of theatre awards, *Copenhagen* was judged Best Play by the *London Evening Standard* and Best New Play by the Critics' Circle, and was nominated for a 1999 Olivier Award.

It is stark theatre - no scenery, three chairs as the only props and a cast of three: Neils Bohr, his wife Margrethe and Werner

Heisenberg on stage for the entire performance.

The focus of the "action" is a recreation of what happened in 1941 when Heisenberg went to Copenhagen to meet Bohr. Shortly afterwards, Bohr fled to Sweden and then the UK, eventually turning up in Los Alamos, where he became a father-figure for the Manhattan project.

Heisenberg played an influential role in the much more modest German wartime effort. Did they exchange physics information in Copenhagen? Did they try to influence each other in any other way? Suspecting that Bohr was in contact with the Allies, did Heisenberg try to dupe them by giving Bohr bad information? Did Bohr try to dupe the Germans by fooling Heisenberg? Who knows? Nobody, but

# Wonderful Copenhagen

In Michael Frayn's play about the uncertainty surrounding Werner Heisenberg's wartime visit to Niels Bohr, one thing is absolutely sure: it's great theatre. He has taken the excitement of discovery, the horror of war and the controversy of Heisenberg's motives on that fateful day in 1941 and skilfully wrapped them all in a cloak of uncertainty.

The action takes place long after the characters are dead and gone. Niels and Margarethe Bohr return from the afterlife for one last try to work out what really happened with Heisenberg. Up to a point, the facts are clear. Heisenberg visits Nazi-occupied Copenhagen to give a talk at the German Cultural Centre. While there, he drops in on his old friend and mentor, and the two of them go for a walk under the trees, just as they did when Heisenberg was Bohr's collaborator. In those days they would walk and talk for hours. This time they are back after minutes and Bohr is highly agitated. Heisenberg had asked Bohr whether it was right to work on atomic energy. So much is certain. All that follows is not, as the characters run through three possible interpretations of the evening's events.

Despite having only three characters, the play mentions all of the great physicists of the era and 30 members of the audience sit in apparent judgement behind the stage. It is as if the characters – the Bohrs as well as Heisenberg – are on trial. Why didn't Bohr hear his old friend out? Why didn't he help him to come to terms with the awful knowledge that he thought he had? And why was Margarethe so willing to condemn?

The Bohr's house is bugged, so conversation over dinner is guarded. Heisenberg advises the Bohrs to visit the German Cultural Centre. Is he trying to tell them something important? We don't know, but a hint comes later when Bohr escapes arrest by fleeing across the water to Sweden. He had been tipped off by an anti-Nazi German

Frayn tries to guess.

Rather than a scientific "whodunit?", the play is more of a "who did what?", with accusations and counter-accusations coming from all three sides. As well as the wartime nuclear fission developments, in the second half of the play the "plot" overflows into basic physics for good measure.

Margrethe (admirably depicted by Sara Kestelman) is portrayed as omniscient. Why did Frayn not depict instead Carl von Weizsäcker, who accompanied Heisenberg to Copenhagen and whose pronouncements on physics would have been more authoritative than those of Mrs Bohr? Probably because the idea is to recreate what happened when Heisenberg went to talk with Bohr at his house, not in his physics institute. Whatever else was on his mind in 1941, Heisenberg cared deeply about Bohr.

David Burke's Bohr is visually evocative. In the Bohr-Heisenberg stage duel, both characters are portrayed as strong and assertive in their dialogue, but in real life their assertiveness and obstinacy lay deeper than their oral skills.

For such a stark presentation, director Michael Blakemore and

working at that same centre. Was Heisenberg behind this?

Uncertainty again. Once in Sweden, Bohr helps to organize the successful evacuation of almost 6000 of Denmark's 7000 Jews. Was Heisenberg somehow involved in that too?

The physics is deftly woven into the plot and Frayn's treatment of the Copenhagen interpretation is a master class for any would-be science communicator. The research must have been prodigious.

The matinee was performed by the play's second cast. David Barron's Bohr was gruff but likeable, and William Brand's Heisenberg was brilliant, naïv, and confused. Heisenberg's love of his country was a thing to be admired, even though Germany was in thrall to a despotic regime. Margarethe, played by Corinna Marlowe, was balm to soothe the men's fraying tempers and reins to pull their straying conversation back on course. If the first cast does half as well, their performance will be well worth seeing.

Frayn adds nothing to the controversy of Heisenberg's visit, the motives of which remain just as unclear at the end of the play as at the beginning. However, he seems prepared to give Heisenberg the benefit of the doubt. When conversation turns to why Heisenberg had never calculated how much uranium-235 would be needed to build a bomb, Heisenberg demands of Bohr:

"Why didn't you calculate it?"

"Why didn't I calculate it?"

"Tell us why you didn't calculate it and we'll know why I didn't!"

"It's obvious why I didn't!"

"Go on."

But it's left to the initially sceptical Margarethe to save Heisenberg: "Because he wasn't trying to build a bomb!"

You could almost feel the relief in the auditorium.

*James Gillies, CERN.*

lighting designer Mark Henderson have pulled out all of the stops.

Frayn says that his interest was whetted by reading Thomas Powers' book *Heisenberg's War* and David Cassidy's biography of Heisenberg, *Uncertainty*.

Science communication is still in its infancy (p29), but full marks should be awarded to Frayn for making compelling theatre out of physics. He deserves special recognition for such a heroic undertaking. The result is certainly riveting and accurate, although scientific nit-pickers will occasionally wince. In places the physics is painted too thickly, blinding the audience with science. But that is by the way.

**Gordon Fraser, CERN.**

● *Copenhagen* is playing at the Duchess Theatre in London until 7 August. For additional information and tickets, you should telephone the theatre box office on +44 171 494 5075 or you can visit the London Theatre Guide Web site at <http://www.londontheatre.co.uk/>.



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