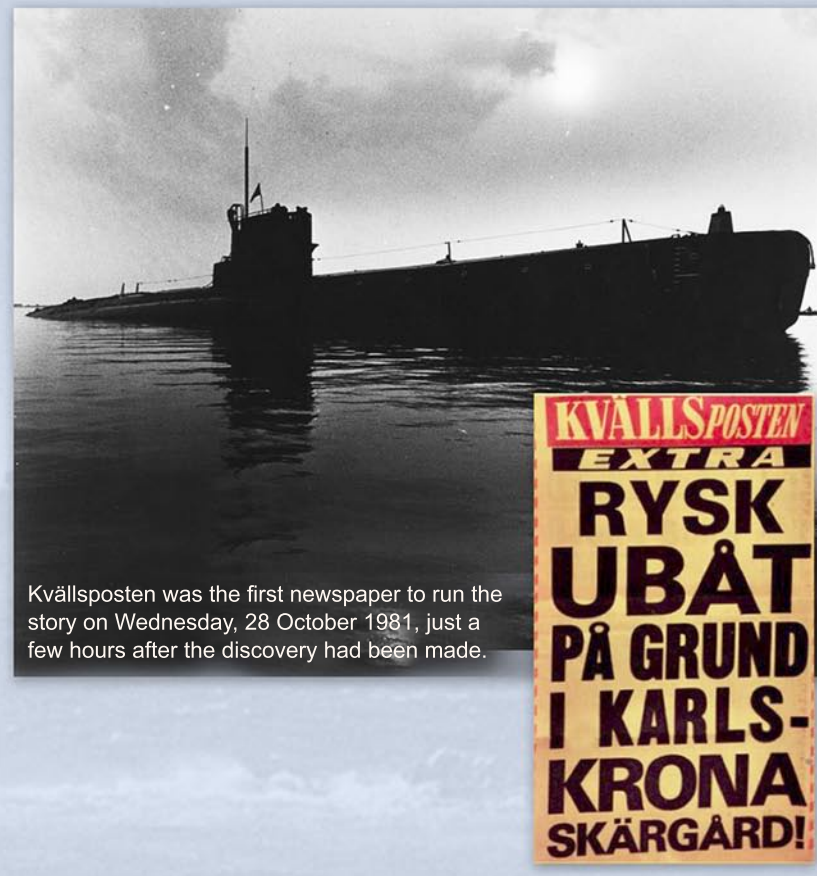
Foreign submarine

A serious political conflict between Sweden and the Soviet Union, in which a Lund physicist played an active role.

Foreign submarine in Swedish archipelago

On the evening of 28 October 1981 the front pages of the newspapers were filled with a surprising piece of news. A Soviet submarine on a secret mission had run aground on a rock in Blekinge archipelago. It was well inside a restricted military area and not far from Karlskrona naval base.



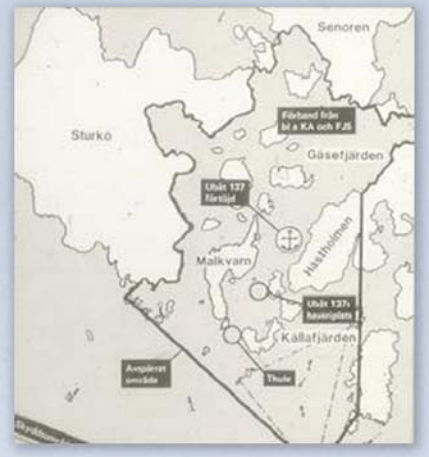
Kvällsposten was the first newspaper to run the story on Wednesday, 28 October 1981, just a few hours after the discovery had been made.

Heightened state of alert

Swedish military units from the navy and coastal rangers, among others, were assembled in the area over the following days.

A large area was cordoned off. Helicopters and fighter aircraft patrolled the airspace and Swedish submarines were stationed underwater along the limit of territorial waters.

The naval ship Thule was stationed as a barrier in the strait out towards open water.



In all probability armed

In an extra edition of the television news programme *Aktuellt*, a week after the grounding, Prime Minister Torbjörn Fälldin revealed that the submarine:

"… in all probability …"

was armed with nuclear weapons.

Political activity in Sweden and internationally was great. This was world news!

DAGENS NYHETER

Vecka 45 Fredagen den 6 november 1981

Kärnvapen på ubåten
Fälldins chockbesked

Den sovjetiska ubåten var med stor sannolikhet utrustad med kärnvapen. Statsminister Thorbjörn Fälldin fastslog detta vid en dramatisk presskonferens på torsdagen. Fälldin betecknade ubåtsaffären som den grövsta kränkningen sedan det andra världskriget. Han uttryckte tillfredsställelse över att hela nationen står samlad bakom protesten till Sovjetunionen i vilken krävs att ett upprepande måste förhindras.

Dagens Nyheter, 6 November 1981. The day after the Prime Minister's revelation that there were nuclear weapons on board the submarine U137.

On a secret mission

In order to investigate whether the submarine was armed with nuclear weapons, measurements of the ionising radiation needed to be carried out. Reader Ragnar Hellborg from the Department of Physics in Lund was one of those who performed the measurements on behalf of the Swedish Defence Research Agency:

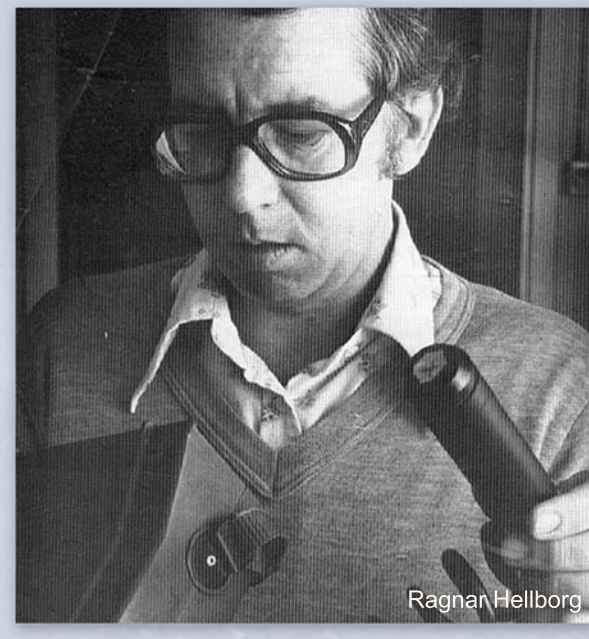
It was around dinnertime on All Hallows' Eve when the phone rang. I was with a doctoral student in the control room of our accelerator. We were planning to carry out accelerator experiments over the three days and nights of the weekend.

At the other end of the line was a colleague from the Swedish Defence Research Agency. His brief question was:
– We need help to measure neutrons, do you have access to a suitable monitor?

My answer was also brief:
– I'll fix a neutron monitor and go home, pack a small bag and await further instructions by telephone.

Once home with the monitor packed in a bag, the police rang:
– We have orders to fetch you and drive you to the county boundary, where the Kristianstad force will take over.

The national police commissioner, who had been given the task of arranging transport by the Supreme Commander of the Swedish Armed Forces, was cunning and divided the journey between four police cars. No individual police officer would easily be able to work out the purpose of my journey.


Ragnar Hellborg

Gamma radiation

The first, simple measurements were taken with handheld gamma and neutron instruments during the night of All Hallows' Eve, Friday 30 October.

The measurements indicated gamma radiation from a point a metre or so behind one of the torpedo openings at the bow of the submarine.

The conclusion from these first measurements was that there was a gamma source within a metre or a few metres of the detector in the direction of the submarine.

Gamma detector

In order to determine what type(s) of atomic nuclei were emitting the gamma radiation, much more advanced equipment was needed. This equipment was fetched during the Saturday night from the Department of Physics in Lund and the Defence Research Agency in Stockholm. Among other things, two containers with a total of 50 litres of liquid nitrogen (temperature -196°C) were transported from Lund to be used to cool the very advanced gamma detector.

Mysterious measurements

On Sunday evening the measurement equipment was loaded onto the coastguard vessel Tv103. The equipment was placed below deck, so as not to be visible from above.

The crew on the submarine were under no circumstances to find out that radiation measurements were being taken. The crew of the coastguard vessel were also kept in the dark. They believed that their ship was being used for radio interception. The equipment was set up and trimmed.

Explanatory sketch of the positioning of the detector as close to the submarine as possible. The long horizontal tube pointing towards the submarine contains the sensitive gamma detector.

Below deck

The experiment equipment below deck on the coastguard vessel Tv103, photographed by Ragnar Hellborg.

Ragnar Hellborg recounts:

"The coastguard vessel was in position alongside U137 at around 22:00 on Sunday evening. Then the trimming of the measurement equipment and energy calibration of the detector began. This was carried out with the help of radioactive preparations that I had taken with me from Lund. A major problem was finding a good electrical earth. The electricity sockets on the coastguard ship were 220 V AC, but they were not earthed.

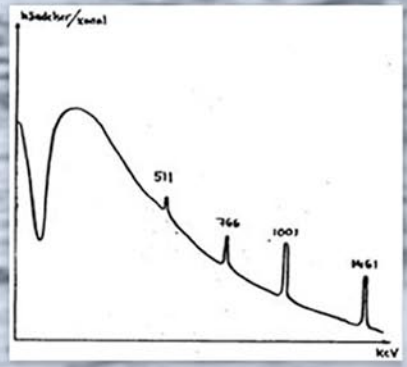
Using odd bits and pieces like string, insulating tape, wire and extension cables, as well as various kinds of tools, I managed to get the electrics of the detector stable. If it wasn't properly earthed, the measurements would have been useless. Everything was ready – the detector stood on a bunk with the sensitive part nudging the hull of the boat. The hull of U137 was less than half a metre (18 inches) away. I pressed the button to start collecting data, and checked my watch – it was 2 a.m. on Monday morning.

Finally a result

After only 20–30 minutes, two clear signals could be observed with energy of 1001.0 keV and 766.6 keV. These signals unequivocally identified the radiation as being due to the presence of atomic nucleus ^{238}U.

There was uranium on the submarine!

The measurements continued until the morning in order to gather reliable statistics.



Appearance in principle of the measurement results.

Like a Hiroshima bomb

Cutting from *Dagens Nyheter* of 11 November 1981, with the revelation of the amount of uranium calculated to be on board.

Forskare avslöjar:

Ubåten hade 10 kilo uran ombord

Det fanns minst tio kilo uran ombord på den sovjetiska ubåten. Det avslöjar docent Ragnar Hellborg, kärnfysiker i Lund. Hellborg deltog i de mätningar som gjordes kring den grundstötta ubåten.

Based on the measurements performed, Ragnar and his colleagues were able to calculate that the explosive force corresponded roughly to the bomb dropped on Hiroshima.

Many years later, after the break-up of the Soviet Union, Russian revelations confirmed that the Swedish measurements, calculations and estimations had been correct.

Mentalt var alla förberedda på risken för en eventuell död, trots att faran i ordern inte låg i själva sprängningen av ubåten. Men ombord fanns i torpedtuberna torpeder bestyckade med kärnstridsspetsar. Effekten av en detonation med en sådan kärnstridsspets är ungefär lika stor som bomben som släpptes över Hiroshima.

Kärnvapenexplosion! Det var fruktansvärt att bara tänka på all förstörelse och de mångåriga konsekvenser som det skulle kunna få.

Ubåtens chifferexpert samlade tillsammans med sekonden ihop alla hem-

Extract from the book *Inifrån U137: Min egen berättelse* which is based on a manuscript written by Lieutenant Captain of the submarien Vasilij Besedin.

Revelations

U137 hade kärnvapen ombord

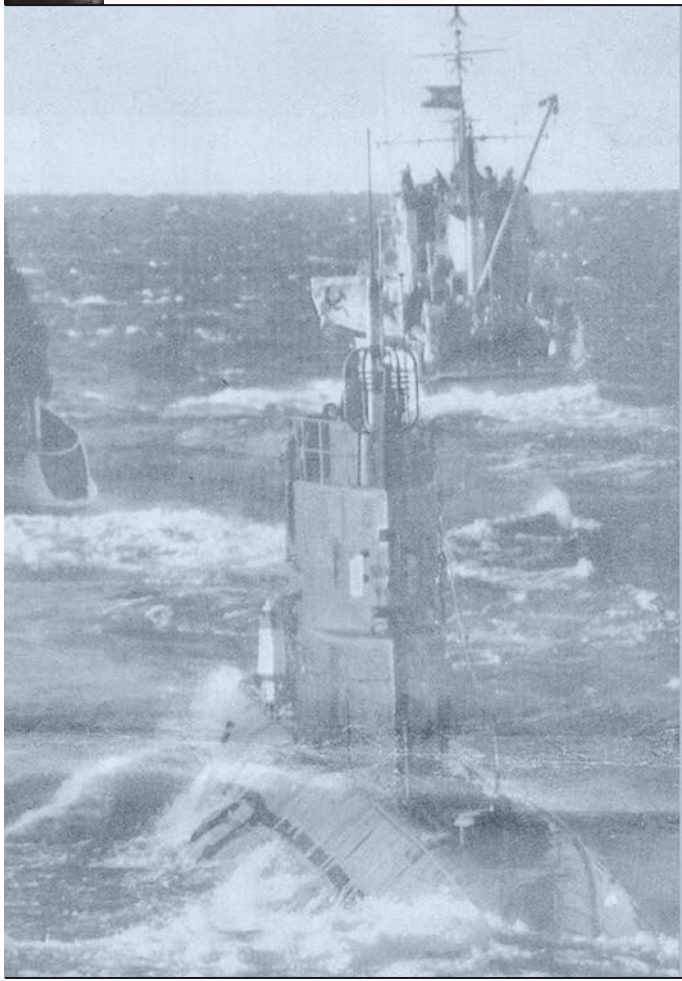
Kaptenen var beredd att spränga ubåten

Cutting from *Sydsvenskan*, 23 January 1992. The article was published after a TV3 interview with the captian of the submarine.

Another revelation was made in an interview with the captain of the submarine Anatoly Gushchin shortly after the fall of the Soviet Union.

Gushchin said that he had received orders from Moscow to blow up the submarine if the Swedish military attempted to storm it.

What happened next?



A fierce storm forced the measurements to stop on Monday morning. The storm was so fierce that the submarine had to be pulled off the rock so as not to break up against the cliffs. Soviet units were not permitted to pass into Swedish territorial waters and a Swedish tug therefore pulled the submarine off the rock. A few days later, when the interrogation of Anatoly Gushchin was complete, the submarine was handed over to Soviet forces, which were waiting just outside Swedish waters.

Why the Soviet submarine ended up in the archipelago has never been resolved, but the discovery of uranium resulted in one of the sharpest protest notes that Sweden has ever issued.