

Herwig Schopper Biography toolkit

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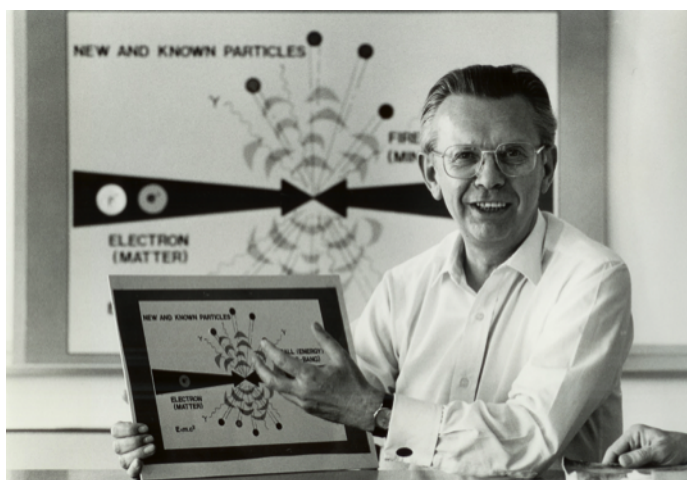


Figure 1: Herwig and the Electron and Positron collision

1 Introduction

A document by Adil Ghafoor Mian as part of the CERN 2021 Summer Student Internship. Prepared for James Gillies as an aid for the biography of Herwig Schopper, published by Springer.

In order to efficiently categorise the different points of interest in the document I have entailed recommendations with the following layout, separated into subsections for each chapter:

- Narrative
- Structure
- Historiography
- Miscellaneous
- Resources (literature, quotes and images)

Each Chapter will have its own dedicated section, with subsections on the aforementioned points, followed by corresponding images and quotes.

Notes:

1. Some points may seem contradictory, such as suggestions of anecdotes and quotes as introductory text, however their inclusion is to serve for breadth and diversity of choice for whatever is seemed appropriate.
2. With respect to the resources section a * represents the need to find a reference for the corresponding text.
3. In relation to the 'Structure' section I will try to outline a general chapter timeline to aid with compartmentalising if needed.

2 Chapter 1: Early Life

2.1 Narrative

- Intergenerational access. Herwig inherited his passion of physics from a chance encounter in his grandfathers hotel, more focus could be built around this experience to engage reader as a narrative focal point and a recurring theme, that Herwig himself stresses of 'right time, right place.'
- The Church as a place of music, Richard Wagners' mission of unification found in the Church. Later Herwig would welcome the Pope and the Dalai Llama to CERN, as seen in 2, and talk of similarities between the vacuum of space and vacuum of thought with the latter.
- The first chapter especially could benefit from the 'active voice' to bring immediacy to the writing. For example, 'In Landskron, returning as prisoner of war from Russia...' could be written as 'In Landskron, he returned, as a prisoner of war, from Russia...'

2.2 Structure

- Accounts of outreach activities and establishment of facilities like SESAME, Cyprus Institute and SEEIST, and diplomatic relations with H.M. King Abdullah II of the Hashemite kingdom of Jordan. The account/s could be interwoven in the chapter's early point of Landskron allowing Herwig to experience a multi-ethnic upbringing.
- Would it be of interest to dedicate a titled section to anecdotes such as the one relating to the hotel? the title could be 'Wind to waves in the sea' for example. I feel this would encourage the reader to compartmentalise such periods of significance, as you mentioned for chapter 4 I believe.

2.3 Historiography

- Decline of German as a scientific language post WW1, tying into the usefulness of Herwig's English acquisition.
- Subjective nationality during wartime, how others such as Gunter Grass and Siegfried Lenz, to of the greatest writers of the 20th century, shared a similar destiny and settled in Hamburg after the war after acquiring german citizenship.
- An example of Tomáš Masaryk's liberal policies on migration/integration to help ground his popularity.

2.4 Misc

- As mentioned above each chapter could begin with an anecdote or a quote, if the former the anecdote could have an attached title that is more metaphorical, as a counter-device to heavy historicism.
- As an overall thematic device we could ask Herwig to recount or send us scans of the music sheets he feels are most memorable for each chapter, and somehow find an apt literary shoe connecting the chapters through writing and narrative

2.5 Resources

2.5.1 Literature

1. *’...and on 30 September 1938 at a conference in Munich, France, Great Britain and Italy yielded to German demands to cede the Sudetenland...’

2.5.2 Quotes

- “When my chemistry and physics teacher visited us,” recalls Herwig, “he helped to stimulate my interest in physics in a way that would be unimaginable today. For instance, he once brought to our home a bottle of mercury and I remember he put the mercury on the kitchen table and I could play with it with my fingers, bringing together bigger and bigger bubbles. It would be impossible today to have children play around with mercury like that, but it doesn’t seem to have done me any harm.”
- “My classmates were given an emergency Maturity qualification, they didn’t have to go through the Maturity examinations,” says Herwig. “They disappeared but I stayed and strangely enough, the whole teaching of that class continued with me as the only pupil.”
- “So there I was, a little boy running around carrying this big bass instrument with me. The combination of the piano and the bass taught me to appreciate music not only from the point of view of chamber but from the point of view of orchestra as well, so that was an important aspect of my youth.”

2.5.3 Images

Pope John Paul II and the 14th Dalai Lama, Tenzin Gyatso, visiting CERN. The encounter between the religious leaders and scientists offered an opportunity for a fruitful and lively discussion about the relationship between religion and natural sciences.

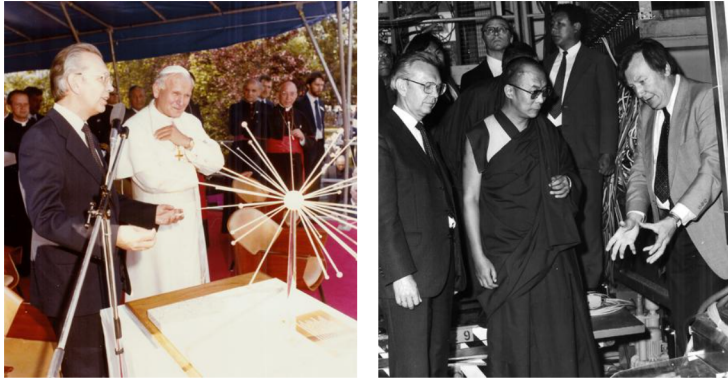


Figure 2: Herwig welcoming the Dalai Llama and the Pope to CERN

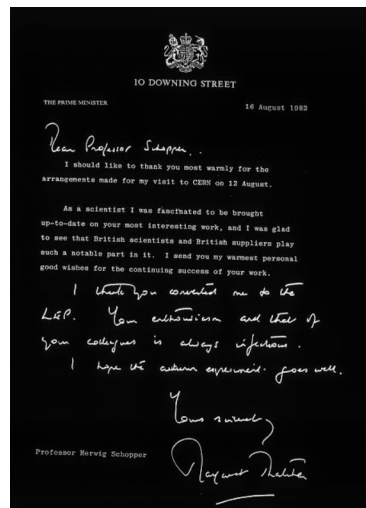


Figure 3: Letter from Margaret Thatcher to Herwig for the consideration of LEP

3 Chapter 2: The War Years

3.1 Narrative

- Expanding on the scientific education and why the regime thought it important to train in non-combat roles, interesting point of German scientists success inter/nationally in some ways as a result of the war efforts.
- It would be interesting to see if Herwig would like to offer a concrete example of his teacher's practice of 'comparing implicitly the Nazi mentality to communist mentality pretending the two were opposite'.

3.2 Structure

- Conscription - War Zone - Dancing in Halle - Signal Corps - Russian Front - Trial - Suburb of Kladow - Radar - Rhine - Last two strongholds - Prisoner - Interpreter.
- Sans Souci story as the opening text, title - 'Christmas trees over Sans Souci'.

3.3 Historiography

- Contextualise and contrast the publicised goal of RAD (reducing unemployment) with the reality through statistics/figure.
- Build an overall image of Hitler's ambitions of reducing unemployment for fear of the lower class' approval of communism. RAD initially voluntary, then a compulsive service - abolishment of trade unions (Interesting to list the rules of the German Labour Front (DAF)- rearmament - Treaty of Versailles.
- Operation Gomorrah when talking about the daily raids on Berlin. In Chapter 2 a more personal account could act as a literary establishing shot for its mention in Chapter 3 wrt bomb disposal.

3.4 Misc

- It would be interesting to have an image of one of these exercises sent by Technical University of Prague or a scan of a specific morse code message that herwig may still have.

3.5 Resources

3.5.1 literature

1. Labour Services in the Weimar Republic and Their Ideological Godparents (Heyck 2003).

2. Wurzburg Riesen (Wikimedia-Projekte 2004).
3. Double box (Cryptic 2010).
4. Sans Souci picture contacts:

Institution	Status
Sans Souci Palace	Not yet contacted
IWM	Awaiting response
RAF	Awaiting response

Table 1: Status of obtaining the Sans Souci Target Indicators image.

3.5.2 Quotes

- “It doesn’t matter what direction the electric current flows,” said the Sergeant. “The only thing that matters is that if a General comes to inspect our company, the answers you give must be uniform, so I order that the current goes from plus to minus!”
- “They knew that within a few minutes we would be there to repair them, and they were waiting with their machine guns. The moment we climbed up the masts to fix the lines, they shot at us. I must admit, this was one of the, most dangerous and most unpleasant experiences I had during the war.”
- When we complained about the hard training he said: “look, it’s not just to make life hard for you, it’s in your own interest, because at war you have to follow orders otherwise your chances to survive are very small. We have to educate you in such a way that you follow orders without discussion.”
- “This was a typical experience for my generation, having to take responsibility at a very young age, and with very little experience, for the lives of other people, even concerning life and death. Such a commitment would be impossible nowadays, and the responsibility was not trivial.”

3.5.3 Images



Figure 4: Nazi propaganda poster for the Reichsarbeitsdienst (National Labour Service).

Doppelkastenverfahren

g	k	e	i
u	v	m	r
p	t	c	x
s	f	n	q
h	y	w	l

k	p	t	c
a	h	f	u
g	e	o	v
q	w	z	y
p	h	i	x

g	k	e	i
u	v	m	r
p	t	c	x
s	f	n	q
h	y	w	l

Beispiel Klartext: „Der Doppelkasten der deutschen Heere...“
 Eintragen in Doppelkiste (21er Kästen)

D	E	R	D	O	P	P	E	L	K	A	S	T	E	N	S	C	H	L	V	E
S	S	E	L	D	E	S	D	E	V	T	S	C	H	E	N	H	E	R	E	

Chi-Text: „dsadb bmeop atvwt qkgno hplkn hehnf snchz mlegu ieabc“

Beispiel: Die sechs Gruppen (DS) in Armee B - Kästen sind: DS
 Ein Text bilden: (m) (n) (l) (q) mit Hilfszeile eine vollständige Gruppe.
 Den Text in die Gruppen eintragen: (m) (n) (l) (q) : Ein Text bilden: (m) (n)
 Das Ergebnis in die Gruppen eintragen: (m) (n) (l) (q) (h) (e) (n) (f) (s) (n) (c) (h) (z) (m) (l) (e) (g) (u) (i) (e) (a) (b) (c)

Figure 5: Double box key - in this example Jürgen Reinhold encrypted the text "The double box key of the German army [s]". The result is: "dsadb bmeop atvwt qkgno hplkn hehnf snchz mlegu ieabc".

4 Chapter 3: Studies at Hamburg 1945 - 1954

4.1 Narrative

- I think the idea of physical labour as a student, as noted in the beginning paragraph, is so interesting and alien to contemporary readers. This could be elaborated on wrt Germany's national psyche, and the previously mentioned RAD, it then ties into Herwig's stress of the significance of experimental physics experience later on in a way, and the usefulness of being taught by technicians
- The unity of physics belief, symmetries and their spontaneous violation, could be reinforced by referencing his persisting belief in unity (after 70 years as a physicist) - as mentioned in his 90th birthday address at a symposium at Cyprus Institute. This could be contrasted with Herwig's skepticism of the hyper-specialisation that now proliferates the field. Also similar to Jagadish Chandra Bose who believe even that there should not be distinction between biology and physics.
- To signify Lise's role in Chapter 5 a sentence about her and Herwig's relationship, formed by the need for communicating in an alien environment, would be helpful on her first exposition in Chapter 3.
- Herwig's PhD work being ignored can tie into a narrative of physics not being a linear process, but rather dependent on geo-temporal factors, this is a studied concept in the history of science, and of particular relevant to this point is James A. Secord's 'Knowledge in Transit' paper.
- We see now a consistent mentor with Fleischmann, to touch upon Herwig's later mentorship would be a welcomed read on the importance of such guidance and making sure we pass it along, as that is how physics is primarily learnt.

4.2 Structure

- Theory with Wilhelm Lenz - Technician at University of Hamburg - Rudolf Fleischmann and unity - old school Goos and Hanchen - Working on gravestones - Nobel prize for chemistry - Herwig and Pohl's hypothesis - polarised light (1950s) - Meeting the greats - Erlangen
- I very much appreciate exposition on Goos and Hanchen, it is refreshing to read. That small section could be introduced with a sub-heading to hone in reader's focus, we could implement this same format for other tangential expositions in later chapters.
- May be interesting to implement Herwig's PhD dissertation title on optics/polarisation in spatial proximity to the mention of Goos and Hanchen to help build foresight for the reader.

4.3 Historiography

- Why did Hamburg attract the vast pool of incredible theorists? Establishing the socioeconomic context of Hamburg in more depth would be great insight I think.
- Establish that Wilhelm Röntgen was the winner of the first nobel prize in physics.
- Fluff out the transition of the language of science from german to english, due to legislation surrounding german scientific academia.
- Specific legislation on the ban of experimental research in nuclear physics.

4.4 Misc

- Would be interesting to use a scan of one of herwigs notes from Lenz's lectures!
- A figure of the experiment from Herwig's masters would be interesting to see

4.5 Resources

4.5.1 Literature

1. *Gottingen Manifesto (Öffentlichkeitsarbeit 1957)
2. Cypress Institute Address (Institute 2014).

4.5.2 Quotes

- "Because he'd worked with both Bothe and Pohl, Fleischmann was not specialised in one area or another," explains Herwig. "He'd acquired and retained a wide understanding, and this impressed me very much. I tried to follow his example all my life – it's really the unity of physics that makes it beautiful."
- "All the work for my Diploma thesis and later for my PhD was done on gravestones."

4.5.3 Images

5 Chapter 4: The years at Erlangen

5.1 Narrative

- We see the privilege and lack thereof of accommodation shaping a lot of Herwig's residential history. Considering the contemporary student audience for the book - whilst we still deal with unfair university housing practices, there is still alienation wrt to the exposition of such housing uprootedness that Herwig has faced. Interesting to expand on this with a broader context on post-war accommodation statistics/historical accounts.
- In celebration of Herwig's 85th birthday, Dr. Josef Rembser had this to say about Herwig's playing - 'The 1980's were unforgettable years, a time of cooperation with Herwig Schopper on the basis of mutual understanding, esteem, confidence and growing friendship. With great pleasure I look back to the hospitality you and your beloved wife Ingeborg (Inge) granted me in your house at Corsier. Here I could stay as invited guest during my official duties in Geneva. The music heard at your home with you, Herwig, at the piano delighted the guests. Professor Kummer from Vienna, my predecessor as President of the CERN Council, was a brilliant tenor, accompanied by you.' This passage could be used to introduce non-linear narrative and impress upon readers the importance of the piano in Herwig's life, and the fact that he seriously considered becoming a pianist is also interesting.
- I think expanding on Herwig's family life would be well to break up the pace from the latter half of a physics heavy chapter, tho I noticed there isn't much Herwig said about his family life in the Ch4 transcripts.
- Would it be possible to comment on why Lise Meitner rejected the MPI post?
- The importance of learning to deal with bureaucracy in Herwig's life, encountered in the university management. A comment on his sharp wit in such occasions: "Not being a physicist, he thought there might be a risk, so I told him that I'd move in as his neighbour"

5.2 Structure

- I think the segmented nature of this chapter works well to guide the reader in navigating information heavy material. Having the approximate year in the sub-headings would be helpful. I think here we can introduce more equations to ground some of the theory.
- It might be helpful to have a general timeline at the beginning of the chapter for Herwig's movements and also a detector development timeline.

- The jump from Erlangen to Mainz is a bit jarring, maybe the carnival anecdote could act as a narrative bridge through social atmosphere and physics.
- A little confusion on the repeatability of the Max Planck Society in Erlangen and Mainz sections, I think it works best in the latter if we are to choose between the two.

5.3 Historiography

- The history of the institute of Max Planck society would be interesting to read for its eccentric focus on personality physics
- Measuring the circular polarisation of gamma rays - we could mention Herwig's 1957 paper with respect to parity failure
- Current state of CERN membership, with statistics on member states

5.4 Misc

- Any correspondence between Herwig and the acceptance of post at Karlsruhe, would be very insightful to see
- A collage of the main accelerators talked about and the dates of their operation would be helpful
- a glossary of terms at the beginning of the chapter - GIS, SPS, KFK, etc...
- . "By making the photon convert into a shower of charged particles, and then collecting all the light, you get a signal that is proportional to the original energy of the particle."

5.5 Resources

5.5.1 Literature

1. *Margrave refuge to Huguenots (Ahrendt 2011).
2. After Dinner Speech by Dr. Josef Rembser (Rembser 2009).
3. Herwig's paper on circ polarisation of gamma rays (Schopper 1957).

5.5.2 Quotes

- "but it was not clear how big DESY would become, and I thought it was not enough for a big country like Germany. I thought that by combining the two institutes in Karlsruhe, we would have the advantages of both: as a university professor, one has great independence with respect to the research you do, and you have close contact with students, which is a great pleasure as well as allowing you to attract the best to the institute."

- "I must say, I suffered a lot from being ridiculed by my colleagues, but I got the last laugh."

5.5.3 Images

Circular Polarization of γ -rays : Further Proof for Parity Failure in β Decay

By H. SCHOPPER
Cavendish Laboratory, Cambridge†

[Received March 14, 1957]

LEE and YANG (1956) suggested several experiments for testing the conservation of parity in weak interactions. Two of these have been performed (Wu *et al.* 1957, Garwin *et al.* 1957†) and have shown that parity is not conserved. Results of a third experiment (thought impracticable by Lee and Yang) are reported here. They confirm the expectation that the γ -rays emitted after β -decay at an angle θ relative to the β -particle should show circular polarization proportional to $\cos \theta$.

Figure 6: Polarised particle source experiment



Figure 7: Herwig and Jentschke at DESY

6 Chapter 5: The Travelling Years

6.1 Narrative

- 'Modern physics' has deep colonial roots, especially when attributing contributions to a singular person, maybe a footnote could be added to attribute this as Western Modern Physics as argued by Raj Kapil in 'Thinking without the Scientific Revolution'
- I think the passage 'so after a short time, she decided to accept an invitation from the physics institute of the Stockholm University College...' could benefit from the addendum that it was out of feeling unhappy, as expressed in the transcript, that she accepted the new post. This would further highlight her feelings towards the attitudes of ageism she was facing.
- Much like Herwig, Abdus Salam also dedicated his life to outreach work, and in many cases sacrificed a pure scientific discovery pursuit for increasing access for Pakistanis, and Ahmadi muslims in particular, who were persecuted in Pakistan. It would be interesting to draw out this connective tissue between the two
- It's interesting the parallels between Chien-Shiung Wu and Lise Meitner's story, both displaced in part due to war, both had to deal with top-level management that did not value their work, both worked as intellectual leads on their respective experiments and known for being meticulous, and both were snubbed for the nobel prize. Could this be a narrative we can build?

6.2 Structure

- History of western modern particle physics - Lise Meitner's position in Stockholm - life in stockholm - neutrino physics - life in cambridge - Colloquium and parity violation - C. S. Wu - Herwig's beta decay experiment - A year at Cornell -...
- Excerpt from Pauli's letter to Meitner.

6.3 Historiography

- Whilst The nobel committee may have not understood the physics interpretation I think it is important to highlight that like other women physicists like Chien Shiung Wu and Marie Curie there is a tradition in discrediting women scientists for their contributions. What is more apparent is that if Meitner did not have to leave Germany, and be separated from Otto Hahn and Fritz Strassman she would have undeniable a colleague of Otto's as a nobel prize recipient. Otto Hahn's deliberate erasure

of her contributions rests on a desperate need, as the leading german scientist of the time, to restore the psyche of the german scientists, in the minds of the german people, and the international scientific community. I am confused by the view that Otto Hahn had no part to play in reducing Meitner's efforts, there is much correspondence that is contrary to the fact, both by Meitner and Otto Hahn.

- This erasure was propagated by the Farm Hall group, who continuously credited solely Otto Hahn for the discovery as noted in the transcript of taped conversations at Farm Hall, and in Weizsacker's article in Nature Vol 383, whereas Fritz Strassman himself argues that Lise was the intellectual leader of their team (Lise, Hanh, Strassman).

6.4 Misc

- Average size of virus is nm scale, varying from 20-500 nm (Britannica 2019).
Size of quark atom $10^{-18}m$ (Ojovan and Lee 2014).
Milky way galaxy is 129,000 lightyears, $1.22 \times 10^{21}m$ (Contributors 2019).
Solar System is 18 billion km - $18 \times 10^{12}m$, using aphelion of Neptune's orbit (Coffey 2008).

Taking a median virus size of 260nm we get a ratio of $1 : 2.6 \times 10^1$.

The ratio of the milky way galaxy to the solar system is $1 : 6.78 \times 10^7$.

Not sub-nuclear, but considering sub-atomic scales using size of neutron $10^{-15}m$ (University 2019), AND a small virus (70nm) we get a ratio of $1 : 7 \times 10^7$.

- For the second comparison, a statement could be 'a virus (small) is as the solar system to one of Saturn's moons, Enceladus (Saturn's sixth largest moon 500km in diameter), of course any object in size range of 40-900-km would be appropriate for a virus size between 20-500 nm $18 \times 10^{12}m / 500 \times 10^3m = 3.6 \times 10^7$.

Statement: 'but by comparison with the sub-atomic, and sub-nuclear worlds to which Herwig would later travel, a virus is as the galaxy to the solar system (CHECK), or the solar system to WHAT.' checks out for sub-atomic statement, but not sub-nuclear. A small virus compared to the sub-nuclear scale is a factor of 10^3 larger than the milky way galaxy is to the solar system.

- Light microscope - Resolving power = 0.25-0.30 micrometres, magnification of 500-1500x.
Electron microscope - Resolving power = 0.001 micrometres, magnification of 100,000-300,000x (Aryal 2019).

6.5 Resources

6.5.1 Literature

- Ruth Lewin Sime - Lise Meitner, A Life in Physics (Sime 1997).
- Transcript of Surreptitiously Taped Conversations among German Nuclear Physicists at Farm Hall (Hall 1945).
- Nature Vol 383 (Weizsacker 1996).

6.5.2 Quotes

- "What difference does it make that Lise Meitner did not directly participate in the "discovery"?? Her initiative was the beginning of the joint work with Hahn 4 years later she belonged to our team and she was bound to us intellectually from Sweden [through] the correspondence Hahn-Meitner. ... [She] was the intellectual leader of our team, and therefore she belonged to us even if she was not present for the "discovery of fission."
- I found it quite painful that in his interviews [Hahn] did not say one word about me, to say nothing of our thirty years of work together. His motivation is somewhat complicated. He is convinced that the Germans are being treated unjustly, the more so in that he simply suppresses the past. Therefore while he was here his only thoughts were to speak for Germany. As for me, I am part of the suppressed past, the more so as I wrote him before he came here and tried in the friendliest possible way to let him know that decent Germans can help Germany only if they are objective.
- Hahn's response was to define the discovery as the three weeks' work he and Strassmann had done in Dahlem in December. Although at Christmas 1938 he still regarded Meitner as a partner and the discovery as "a kind of work by the three of us," by February 1939 he was sure he and Strassmann had "absolutely never touched upon physics, instead we only did chemical separations over and over again," and in March he believed the discovery was "contrary to every physical authority."

6.5.3 Images



Figure 8: Polarised particle source experiment

7 Chapter 6: The DESY Years

7.1 Narrative

- Schmidt-Parzefall mentorship role, connective intra-chapter story of passing on intergenerational skills
- The Argus detector and its role in domains like Biology, and how even now accelerators like CERN work with local hospitals
- '...nowadays, the emittance is essential for good biological research, and the emittance of PETRA can be better than that of most other synchrotron radiation' - Transformation of particle facilities for other purposes, I think a few lines on this would help readers understand the transformation accelerators go through, and that they aren't single use machines.
- 'Science for peace' - the example of the Chinese students coming to DESY for China's first international visit wrt particle physics is interesting, and if encompassed by China's history and interest in western science, could be a refreshing excerpt in the book. I have some literature on this if that would help

7.2 Structure

- I think the structure of following the different accelerators works well, if we can keep it to DESY, DORIS, PETRA and HERA
- Timeline of the discovery of J/ψ , b meson/ W and Z boson/gluon particles.

7.3 Historiography

- J/ψ particle and Ting's patience with his results, may be interesting to set Salam/Pauli as a counter-example for the importance of one's belief in one's own work
- Nobel prize for C. S. Wu, I think it's important to mention her excellence as an experimental physicist and possible reasons for the Nobel prize controversy.
- Fermi Labs erroneous observation of a J/ψ particle in 1976.
- HERA being Herwig's legacy, we can categorise his efforts in the context of empowerment and science for change, because at that time women in physics was a 'singularly unfeminine' concept, even if by today's standards it may seem awkward.

- In relation to the question why the IRS was not readied to detect the charm I think from conversations with my supervisor and initial research that priority to the detector at IRS was given, as the world's first hadron collider, to measuring QCD effects. Being the breakthrough theory at the time, I imagine there was a lot of pressure to validate such searches, as noted in the CERN reference. The detector was optimised in the forward direction, but not for particles with large transverse energies, as noted in the Wikipedia entry, so whilst it produced the J/Psi it couldn't detect the muons. I'm not sure this helps in answering the question, let me know if this seems a useful line of inquiry and I can look more into the general atmosphere at IRS wrt doubts around its usefulness as a hadron collider, and how much that played a factor in Ting's placement at Brookhaven.

7.4 Misc

- Correspondence from university of Hamburg inviting Herwig to become director of DESY.
- Include equation for energy radiated per revolution for excerpt '...the losses due to the emitted synchrotron radiation go up with the fourth power of the energy'.

$$\Delta E = 4\pi e^2 \beta^2 \gamma^4 / 3R \quad (1)$$

$$\gamma = E/mc^2 \quad (2)$$

$$\Delta E \sim m^{-4} \quad (3)$$

- I think it would be really insightful to have an account of how Jentschke went about

7.5 Resources

7.5.1 Literature

- Observation of high mass dilepton pairs in hadron collisions at 400 GeV (Hom et al. 1976).
- Search for gluons in e+e annihilation (Ellis, Gilliard, and Ross 1977).
- IRS Transverse Momentum (Wikipedia 2021).
- IRS QCD effects (CERN 2018).

7.5.2 Quotes

- 'But Jenschke, being an experienced experimentalists, he thought , "I don't believe these theorists. Nature is more imaginative than the theorists.'

- I'm sitting in the office of Mao Zedong." I said, "Okay. What is the matter?" He replied, "Well, I'm discussing with him whether he would not be interested to send for the first time Chinese scientists to Western foreign countries." This happened in 1978 immediately after the Cultural Revolution at a time when contacts between China and Western countries did not exist. So I said, "Okay. Why not? How many people do you think they would like to send?" he consulted Mao Zedong and came back "What about a hundred?" my reply, " a hundred maybe is a little bit too much. Why don't we start with a dozen?" they agreed, "Okay, we start with a dozen."

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