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The Wonderful World of Wallywood

Larry McLerran

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Physics Department
Nuclear Theory Group

Brookhaven National Laboratory
P.O. Box 5000
Upton, NY 11973-5000
www.bnl.gov

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The Wonderful World of Wallywood

L. McLerran
RIKEN BNL Research Center, Brookhaven National Laboratory, Upton, NY 11973, USA
Physics Department, Brookhaven National Laboratory, Upton, NY 11973, USA

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This paper presents a personal account of the scientific and professional adventures of Walter Greiner. It is based on an "after dinner talk" given for the celebration of his 70'th birthday held at the Frankfurt Institute for Advanced Studies on April 3-6, 2006.

1. Introduction

It is a great honor and personal pleasure to give this talk celebrating the accomplishments of Walter Greiner, and to honor his 70th birthday. My wife Alice was unfortunately not able to be here. She values Walter very highly as a friend, appreciates him as a scientist, and helped in preparing this talk.

Alice gave me one strong piece of advice: Do not adapt the same story I told at the beginning of a talk celebrating Bikash Sinha's 60th birthday to offer at Walter's 70th!

(You see, I had heard rumors that Bikash was a little nervous about the talk I was going to give. I said he was feeling like a 60 year old virgin on his wedding night. He had a vague idea of what was to come, but not specific knowledge. This story clearly does not apply to Walter because he is 70.)

Others were also involved in preparation of this talk. I enjoyed the collaboration of family members and close friends able to contribute to photos and stories from the past. In particular, I gratefully acknowldge the help of Horst Stöcker, Carsten Greiner and Barbara Greiner.

2. Portrait of the Scientist as a Young Man

This talk is about the growth of a young boy into one of the great men of theoretical nuclear physics.

In the photo 1a, you see a young lad and his suitcase. This shot is symbolic of the life that lay ahead: Walter is always on the road. Carsten says that even then, Walter was planning on a career as a travelling salesman. I like the photo since it shows a boy who, by the firmness with which he holds his suitcase, is asserting control over his world; a world which was in the midst of war, and collapsing around

a b c

Fig. 1. (a) Walter at ages 4-5 in Rennsteig in Thüringen (b) His first day in elementary school, in 1942. (c) Walter as a young student at the University of Frankfurt where he did his pre-diploma work. He is about 20 years old

him. In the photo 1b, Walter is enjoying his first day of school. He looks happy. Perhaps he has already glimpsed his future, and decided to become an academic. The next photo 1c shows him as a young man at the university. Again, one can see the enthusiasm in his smile.

Walter became a diploma student at the Technische Hochschule in Darmstadt. In the photo, Fig. 2a, taken in 1959-1960, Walter wanders in the perpetual foggy haze which surrounds diploma students. In Fig. 2b, he is shown as a PhD student at the University of Freiburg with his advisor Prof. Hans Marschall. It is 1961, the sun is out, and clearly a new day has dawned. He is eager to make his mark in the world. There is a story that Walter did his thesis (on nuclear polarization in muonic atoms) in 3 months, but had to wait one more year to get his degree.

In the early 60's, Walter went off to the United States. He first taught as an assistant professor at the University of Maryland, where Martin was born in 1963. In 1964, he was back at the University of Freiburg as an assistant professor, where Carsten was born. At Maryland was an assistant professor (1962-1964). (Even then he had the remarkable property of being at many different places at the same time, rather like Schrodinger's cat, but without meeting the same fate.) That same year, 1964, he received an offer of a full professorship at the University of Frankfurt and also at the University of Darmstadt, and turned down a promotion to associate professor at University of Maryland. He was 28 years old. Later he turned down offers of full professorships at the University of Virginia and at Duke University.

In other words, Walter was hot stuff.

a

b

Fig. 2. (a) Walter as a diploma student at Darmstadt (b) Walter and his advisor Prof. Hans Marcshall in 1961 at Freiburg.

With Michael Danos from the National Bureau of Standards Walter developed the Dynamic Collective Model, in which the $T = 1$ giant dipole and quadrupole resonances wer coupled to the low-energy surface vibrations of nuclei, predicting a multitude of splittings of the giant resonances. This lead to a considerable stimulation for photonuclear physics.

At Charlottesville, Virginia, Walter met Judah Eisenberg. Together they wrote their 3-volume textbook on Nuclear Theory (North Holland) which since had several editions and is still in use today. Judah moved later to Tel Aviv from where he and Walter established a close Tel Aviv-Frankfurt scientific axis, based on their friendship.

In the photo 3, Walter is becoming "ordinarius" at the University of Frankfurt, starting January 1, 1965. He gave a lecture, "Is the Nucleus a Superconductor?" In fact some of his former students, who are quite well known, still work on variations of this problem. The area has a fancier label now, called "Color Superconductivity", and it is about quarks rather than the nucleons in a nucleus, but in many aspects it is similar to what Walter first discussed about 40 years ago. The announcement for the lecture is shown in Fig. 4

3. Welcome to Wallywood!

Some time ago, I was at a meeting organized by Walter in Peniscola, Spain. While I was having dinner with Mike Strayer, Mike introduced the word Wallyworld into my vocabulary, using it to describe the breadth of dominion of Walter's influence. The term has it origins in a movie starring Chevy Chase about the family Griswald driving accross the country to go to a famous theme park: Wallyworld. The symbol of Wallyworld is the moose, Wally. (A moose is the biggest animal in the Great North Woods. Mooses are generally gentle vegetarians, but if provoked, can be very dangerous.)

Fig. 3. Walter at the University of Frankfurt in 1965.

JOHANN WOLFGANG GOETHE-UNIVERSITÄT
Frankfurt am Main

Am Montag, 9. Mai 1966, 12 Uhr c. t. findet in der Aula der Universität die feierliche Antrittsvorlesung des Ordinarius für Theoretische Physik,

Herrn Professor Dr. rer. nat. Walter Greiner,

über das Thema

„Ist der Atomkern ein Supraleiter?"

statt.

Wir beehren uns, hierzu einzuladen.

Frankfurt am Main, den 25. April 1966

Rüegg
Rektor

Staude
Dekan der Naturwissenschaftlichen Fakultät

Die Vorlesungen fallen in der Naturwissenschaftlichen Fakultät von 12-13 Uhr aus.

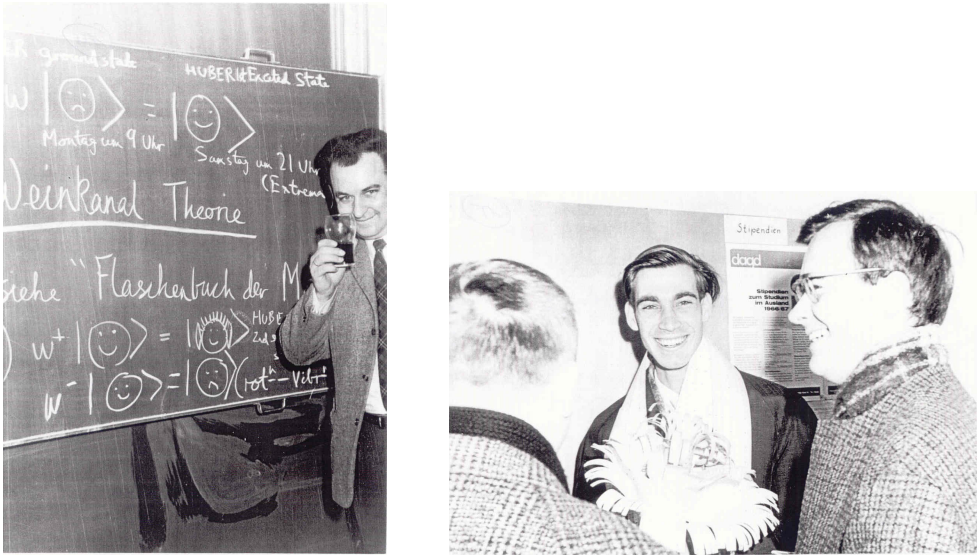
Fig. 4. The announcement for the lecture where Walter receives his "ordinarius".

In the following figures, I offer pictures related to Wallyworld that can be found on the internet.

One of the first achievements of Wallyworld was, one might say, culinary: The derivation of a theory about Frankfurters with wine. In Fig. 6a you see Professor Max Huber, who did his habilitation as Walter's assistant and became first professor

(a) (b)

Fig. 5. a The offical website of E-Wallyworld. b The book, "Children of Wallyworld" , starring the Bleach Boys



a b

Fig. 6. (a) Professor Huber and Weinkanal theory. (b) The first student of Wallyworld.

at Erlangen, then professor at Bonn, and eventually president of the University of Bonn. Presently he is vice president of the German Academic Exchange Service (DAAD). Prof. Huber's theory is known as Weinkanal theory, and one can glimpse on its explanation in the photograph. The operator W^+ adds a bottle of wine to a state, while W^- removes a bottle of wine. The states are Frankfurters with a number of bottles of wine; the ground state is a Frankfurter with no bottle of wine The question is whether or not Frankfurters with wine are bosons or fermions. As you can clearly see from the figure, the happy state has one bottle of wine. If Frankfurters were fermions, adding a second bottle of wine would annihilate the Frankfurter. Professor Huber has added another bottle of wine, and the result is a very happy excited Frankfurter. Therefore Frankfurters with wine are bosons. One can add an infinite number of bottles of wine to a Frankfurter without annihilating the Frankfurter.

In Fig. 6b, there is a picture of Walter's first PhD student, Prof. Hans Weber, who is now at the University of Virginia. He is talking with Walter's assistant, Prof. Dieter Drechsel, now at Mainz. They may be, in spite of their cheerful expressions, discussing ways to prevent brain drain from Wallyworld. The poster in the background says "Stipendia in Foreign Countries: That is the Way to Go".

(a) (b) (c)

Fig. 7. a One Smokin' Professor. b The Wally world Navy. c Defending from a sneak attack by the Russians. In the foreground one recognizes the Nobel laureate Prof. I.M. Frank.

Every great dominion needs a strong leader, Fig. 7a, and there was never one so naturally gifted for this role as Walter. He began early, and established a navy, Fig. 7b. Please note a young Admiral Scheid. Walter also would organize a vigorous defense when attacked by Foreign Powers, Fig. 7c, as seen in this view of him protecting Prof. Toepffer of Frankfurt, Johannesburg and Erlangen, from a sneak attack by the Russians.

Of course any strong leader makes enemies. One may even lose friends, and that

a b

Fig. 8. Anti Walter propaganda from the usual sources of trouble

hurts. Those of us who have tried to build institutions know how it can happen, and it always makes one sad, and can cut most deep. In other circumstances opposition is easier to deal with – when, for example, you are attacked by radical students, as shown in Fig. 8. William Blake penned an instructive poem to read when this happens:

I was angry with my friend:
I told my wrath, my wrath did end,
I was angry with my foe:
I told it not, my wrath did grow.

And I water'd it in fears,
Night and morning with my tears,
And I sunned it with my smiles,
And with soft deceitful wiles.

And it grew both day and night,
Till it bore an apple bright,
And my foe beheld its shine,
And he knew it was mine –

And into my garden stole,
When the night had veil'd the pole,
In the morning, glad, I see,
My foe outstretch'd beneath the tree.

William Blake

There is a story about Ricky Nelson, a 1960's rock singer in the US. He was a child star of American television, and as he grew up on TV he began singing pop songs. He became somewhat of a teenage idol, but as he grew older, he, largely disappeared from the scene. When he was in his forties, he was invited to a reunion of rock singers at Madison Square Garden. He looked different than when he was a kid, and he sang songs which interested him rather than those that in his youth had made him famous. The audience responded by booing him off the stage. While flying back to California he wrote a song, "The Garden Party". The chorus is

But it's all right now.
I learned my lesson well.
You see, you can't please everyone,
So you got to please yourself.

Ricky Nelson (1972)

The song became his biggest hit, and is the song for which he is remembered.

(a) (b) (c)

Fig. 9. a Walter in a nice moment with his wife. b Walter enjoying the garden party.. c Professor Toepfer roasting Frankfurters. Martin helps. .

Walter has had his own garden parties, and known how to enjoy them. With all of responsibility he had acquired, relaxed times with family and friends take on a special significance. In Figs. 9 - 10, there are photos of one such party. The pictures show how important family was to Walter. I particularly like the photo of Walter and his wife.

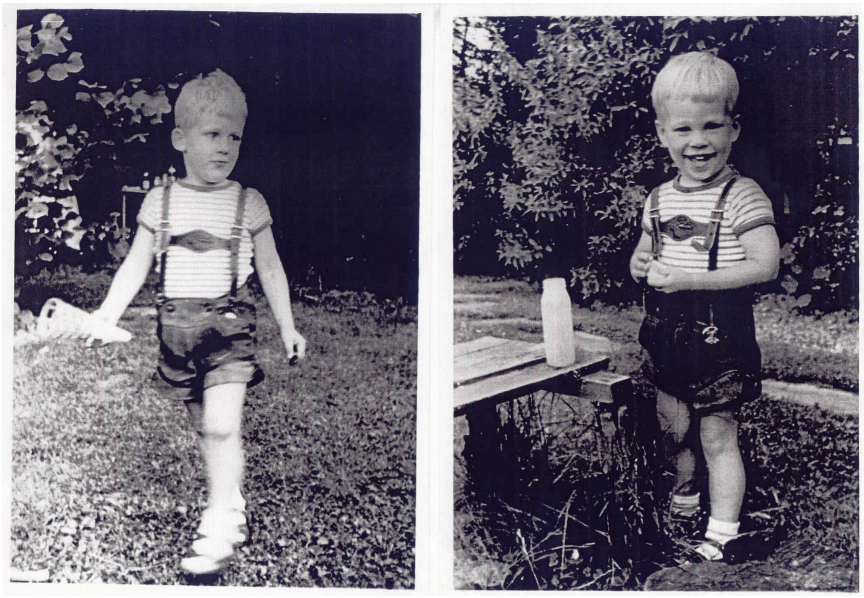


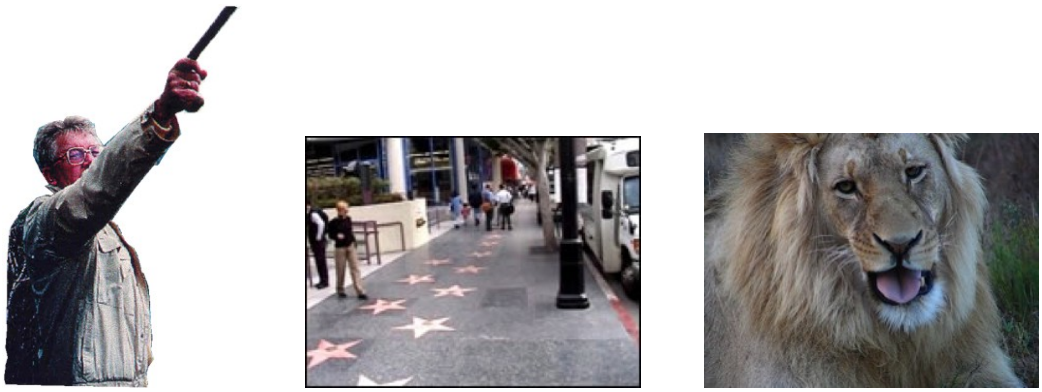
Fig. 10. Martin and Carsten

4. The Stars of Wallywood

Any great nation has its capital, where one can hope to sight its most famous people – its stars. For Wallyworld, the capital is Wallywood, Fig. 11

Fig. 11. The capital of Wallyworld.

Wallywood's most famous director is of course, Walter, Fig. 12a, who is pointing to the Wallywood Walk of Fame, Fig. 12b. There is of course the Wallywood mascot, Miklos the lion, Fig. 12c, who is relaxing underneath a tree.



(a) (b) (c)

Fig. 12. a Director Walter pointing with his walking stick towards the Wallywood Walk of Fame. b The Wallywood Walk of Fame. c The Wallywood mascot, the lion Miklos

4.1. *A Voyage to the Bottom of the Sea*

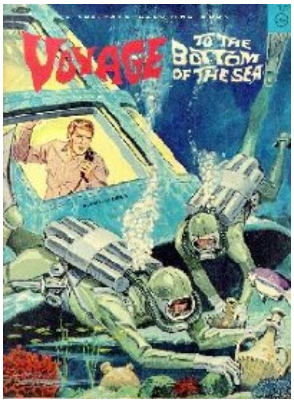
One of the first productions of Wallywood was "Voyage to the Bottom of the Sea". A poster from the movie is shown in Fig. 13 a. You can see Walter steering the submarine at the bottom of the sea, and two divers in front of him.

I would like to think of the divers as Miklos Gyulassy and myself, since the two of us got to know Walter because of his work on this production. The problem that Walter was interested in was the production of electron positron pairs in strong fields. The way this happens is that an electron state becomes so tightly bound in a strong Coulomb field that it becomes a hole in the Dirac sea, corresponding to positron production. In principle, this hole can dive deeply into the Dirac sea. Stimulated by Walter's work in this field, Miklos and I both did theses – he at Berkeley and I at Seattle – on vacuum polarization in strong fields. Later Miklos went off to Frankfurt to work with Walter. While I knew Walter's work well, I did not get to know Walter personally until several years later, when I was learning about ultrarealtivistic heavy ion collisions.

I think, however, it is more accurate to say that the divers in front of the submarine are Berndt Müller and Johann Rafelski, who contributed to the seminal work in this field as Walter's students at Frankfurt.

In Fig. 13b, you see Walter's curiousity aroused by his vision of a hole at the

bottom of the sea. One may ask what aroused his curiousity. The answer can be seen in Fig. 13c. This classic painting of the mermaid is a beautiful piece of art, and should be shown to every young man in the world. It carries a message: No matter how attractive a relationship might seem in the beginning, it may simply by its very nature be impossible.



(a)

(b)

(c)

Fig. 13. a Voyage to the Bottom of the Sea. b Walter discovers there is a hold at the bottom of the sea. c The classic painting of the mermaid.

In Fig. 14, you see Walter together with some of his students. Berndt Müller and Johann Rafelski were Walter's students who went off to investigate the hole in the bottom of the sea. There is a children's song which expresses what happened:

Fig. 14. Berndt Müller, Johann Rafelski and Gerhard Soff with Walter.

There's a hole at the bottom of the sea,
There's a hole at the bottom of the sea,
There's a hole, There's a hole,
There's a hole at the bottom of the sea.

This is of course the first report they sent back, when full of enthusiasm. Of course as they got to the bottom of the sea, they sent back a message showing that things got more complicated:

There's a log in the hole in the bottom of the sea,
There's a log in the hole in the bottom of the sea,
There's a hole, There's a hole,
There's a hole at the bottom of the sea.

Well, they sent back many more reports, and as we know things got more and more complicated. That is, unfortunately, the way things sometimes work. The last message was

There's a smile on the flea on the hair on the wart on the toe on the foot on the leg on the frog on the log in the hole in the bottom of the sea,
There's a smile on the flea on the hair on the wart on the toe on the foot on the leg on the frog on the log in the hole in the bottom of the sea,
There's a hole, There's a hole,
There's a hole at the bottom of the sea.

Berndt and Johann later went of to be famous for their work in ultrarelativistic heavy ion collisions. They collaborated with one another extensively. I think of them as Wallywood stars in their own right, Fig. 15.

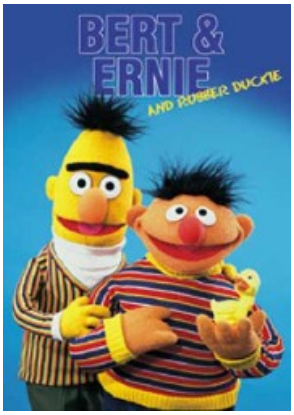


Fig. 15. A poster for the famous children's television and movie stars, Berndt and Ernie

4.2. *Fantasy Island*

There was a famous American television show called Fantasy Island, an advertisement of which is shown in Fig. 16. The plot was different each week, yet followed a certain formula. Someone new would come to Fantasy Island, hoping to live out a certain fantasy. Generally things were more complicated than expected, and the fantasy would often be realized in an unanticipated way.

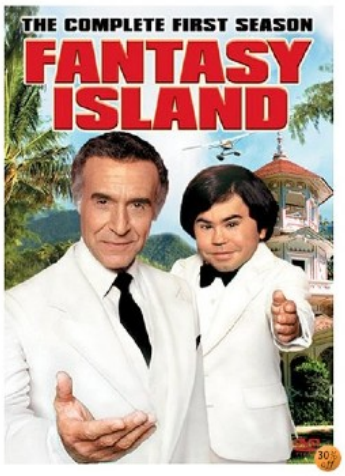


Fig. 16. Ricardo Montalban and Tattoo, promoting Fantasy Island.

Walter's Fantasy Island is formed by the superheavy elements, the so- called island of stability of elements much heavier than those which currently exist in the periodic table. Walter and his group did seminal work in predicting how to make such elements, using his double center shell model. The work that has been done by the experimental groups from GSI and Dubna has shown that such superheavies very probably exist, and they have perhaps even landed on Fantasy Island. In my opinion, the theoretical and experimental work done here is the most exciting "real nuclear physics" that I have seen in my lifetime. The possibility of making really long lived, very heavy, nuclei tests our ideas of nuclear structure in extremum. One can imagine a program of novel experimental searches to let us continue to explore and define this island's geography.

Nuclear structure was Walter's early interest: In the rotation-vibration model (developed with Amand Faessler, who was then a diploma student in Freiburg), the gave the first solutions to the quadrupole collective Hamiltonian of A. Bohr. He expanded this work in various ways to the "Frankfurt Collective Model", as Marcos Moshinsky named it, including the Gneuß-Greiner model and the construction of general collective potential surfaces. Joe Hamilton had his fun with the rotational-

vibrational band structure for nearly four decades. Allan Bromley's experiments on nuclear molecules stimulated to lay the theoretical foundations, utilizing the two-center shell model. This Walter did with Werner Scheid. They summarized much of this work in the monograph "Nuclear Molecules" (World Scientific). It is one of the roots for a life-long friendship between Allan and Walter.

4.3. *Dr. Strangelove*

The group at Frankfurt were the inventors of the idea that there might be abundant heavy flavor production in heavy ion collisions. They also were one of the major groups advocating heavy ion collisions as a place to look for strangelets. Strangelets are made of strange quark matter. Witten some time ago argued that it is possible that ordinary nuclear matter might be unstable with respect to formation of strange quark matter. Strange quark matter is unlike ordinary nuclear matter since it can exists as stable objects to essentially infinite baryon number. Ordinary nuclear matter does not do this. Composed of roughly equal numbers neutrons and protons, large nuclei have a big repulsive electromagnetic self energy, and therefore find it energetically favorable to fission into lighter nuclei. Strangelets are almost electromagnetically neutral, since they have almost equal numbers of up, down and strange quarks, whose charge

$$\frac{2}{3} - \frac{1}{2} - \frac{1}{3} = 0 \tag{1}$$

Therefore one could in principle make a strangelet of arbitrarily large size, and it would eat up surrounding matter. Such objects would, needless to say, be dangerous.

(a) (b) (c)

Fig. 17. a The flyer for the movie Dr. Strangelove. b Walter and Eddie Teller during a colloquium in Frankfurt. c The logo of Mad Magazine.

In Fig. 17a, is a flyer for the movie Dr. Strangelove. Dr. Strangelove was a nuclear physicist who loved bombs. In the movie, he advises the president, and together they succeed in blowing up the world. Dr. Strangelove was supposedly modeled on Eddie Teller, the famous physicist who was the father of the hydrogen bomb, Fig. 17b. Eddie Teller is a popular whipping boy of the left. I met him when a postdoc at SLAC 25 years ago. He had just retired to a conservative think tank at Stanford, and would go over to Lenny Susskind's house for evening pizza seminars. He was quite old at that time – but very sharp, and always thinking about physics. At that time Bjorken and I were trying to understand some peculiar cosmic ray events, and I remember talking with Teller about strangelets (before the famous paper by Witten).

When RHIC and LHC were contemplated, there was much worry in the media about the possibility of making strangelets, and doing much damage to the universe. This outcome is very unlikely, since there are very many processes in nature which would have produced such a catastrophic event if strangelets had the correct properties to trigger it. Several committees were set up to establish that there was essentially zero probability that this would occur.

A media report explaining the concern ends with a famous quote from Bob Jaffe:

> Some scientists, among them Frank Wilczek of the Institute for Advanced Study in Princeton, NJ have said that in theory, RHIC could trigger the runaway formation of a poorly understood breed of subatomic particle known as a stranglet which "eats" all it encounters, a chain reaction which could consume everything, everywhere. Fortunately, most experts aren't worried. MIT physicist Bob Jaffe says the chances of RHIC inducing Armageddon are exceeding rare, bordering on nil, but as he admits "You never know"
>
> www.wired.com

This reminds me of the logo for Mad Magazine Fig. 17c.

4.4. *Attack of the Killer Tomatoes*

Walter's group is most famous for its work on ultrarelativistic heavy ion collisions. Much of the work is on the hydrodynamical aspects of such collisions. It started in the early 1970s when he and Werner Scheid showed in a Phys. Rev. Letter that nuclear shock waves should appear in high-energy nucleus-nucleus collisions, thus leading to compression, heating and flow of nuclear matter. Later, initiated by Walter's former student Horst Stöcker, the various forms of molecular dynamics (MD, RMD, URQMD) were applied to describe the complex nuclear motion in relativistic heavy ion collisions, searching for the nuclear equation of state.

Describing nuclear collisions in terms of hydrodynamics is sort of like the study of tomato-tomato scattering. There was a not too famous movie about tomatoes, "Attack of the Killer Tomatoes", Fig. 18a. In this movie, gigantic tomatoes arrived from outer space. They went on a spree of violence and savagery unlike anything

seen before on a movie: Whole families would be run over and flattened by huge tomatoes. Imagine the terror when you go to bed at night, knowing that early in the morning you may hear a faint sound of leaves rustling in the garden...

(a) (b) (c)

Fig. 18. a Poster for the movie "Attack of the Killer Tomatoes". b Advertisement for the American television show, Mr. Ed. c Poster for the movie "Son of Godzilla".

There are many stars of the ultrarelativistic heavy ion effort. Horst Stöcker is perhaps best remembered for his role as Mr. Ed, The Talking Horse. A front view of Mr. Ed is shown in Fig. 18b. Mr Ed's most famous quote is

A horse is s a horse, of course of course,
Unless it's a horse, of course of course.

The Zen significance of this is not lost on Horst.

There is also the "Son of Godzilla", Fig. 18c, starring Walter and Carsten.

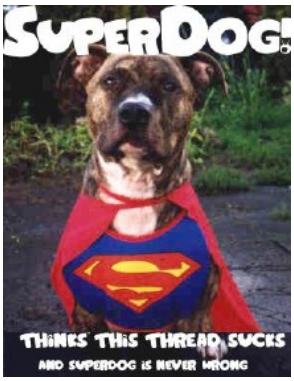
One of the stars of the younger generation is Adrian Dumitru, famous for his role as The Colorful Swishbuckler in "Zorro the Gay Blade", Fig. 19. Young people should always be idealisitic and take on figures of authority, as Adrian does.

4.5. *Color Superconductivity*

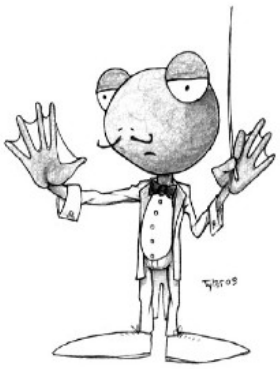
This field has yet to have a movie, but it has its stars nevertheless. There is Colorful Igor Shovkovy, Fig. 20a, Superdog Drrrrrrk Rischke, Fig. 20b, and conductor Jochen Wambach, Fig. 20c. They have put together a group of young people to study the

Fig. 19. An advertizing clip for the movie "Zorro the Gay Blade".

(a)



(b)



(c)

Fig. 20. a Colorful Igor. b Superdog c Conductor Wambach.

properties of matter at very high number density but low temperature, Fig. 21. The idea behind these studies is that at very high matter density and low temperature, matter becomes a superconductor of color charge. This superconductor has the property of expelling color magnetic fields, and magnetic fields as well. It may have applications for neutron stars.

5. Walter's Academic Achievements

Walter is the author of about a thousand scientific papers:

Scientific Papers:
1960-1970: 72
1970-1980: 170
1980-1990: 223

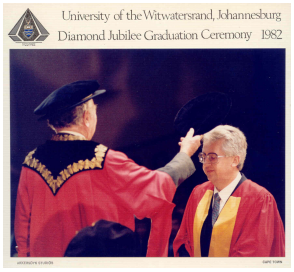
Fig. 21. The Color Superconductivity Group.

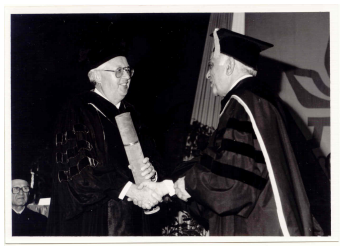
1990-2000: 290
2000-2006: 253

He has been awarded ten honorary PhDs:

1982 U Witwatersrand, Johannesburg, SA
1990 U Tel Aviv, IS
1991 U. Louis Pasteur, Strasbourg, FR
1992 U Bucharest, RM
1997 Lajos Kossuth U, Debrecen, HU
2001 U Nantes, FR
2001 U Nacional Autónoma de Mexico, MX
2002 U St. Petersburg, RU
2003 JINR Dubna/Moscow University, RU
2003 U Kiev, UKR

Pictures of him receiving some of these honorary awards are shown in Fig. 22





(a) (b) (c)

Fig. 22. a Johannesburg 1982. b Tel Aviv 1991. c Strasbourg 1991.

Walters Honors and Awards list is equally long and prestigous:

1974 Max Born Prize and Medal: Institute of Physics, London and DPG
1982 Otto Hahn Prize, Frankfurt/Main, Germany
1986 First Professor in the Frankfurt Chair, U. Tel Aviv
1987 Fellow of Royal Society of Arts, London
1989 Member of Roland Eötvös Society of Hungary
1990 Honorary Professor, Peking University, China
1999 Honorary Member of Romanian Adademy, Bucharest
1998 Alexander von Humboldt Medal
1991 Officier dans l'Ordre Palmes Académiques
2001 Member of Accademia Gioenia di Catania
2001 Honorary Professor, Jilin University, China

In Fig. 23, Walter is receiving the Otto Hahn Prize, presented by Walter Wallmann, who was at the time mayor of Frankfurt, and later prime minister of Hesse.

Fig. 23. Walter receiving the Otto Hahn Prize.

Walter was quite influential in the founding of GSI. I quote from Peter Braun Munzinger who knows the history:

"GSI was founded in 1969 by members of the surrounding universities: Darmstadt, Frankfurt, Heidelberg, and Marburg. Walter was one of the founding fathers and had a special relation with the GSI theory group... At the beginning he developed the two center shell model to deal with the structure of heavy nuclei, fission and fusion. This was very influential. It not only provided the arguments why to try "cold fusion" for superheavy production, but also led to the positron story."

Walter has written a comprehensive course on theoretical physics, of depth and completeness which in my opinion is comparable with Landau and Lifshitz. When I checked on Amazon, there were 46 titles listed under Walter's name. This represents a tremendous accomplisment. (The covers of the books are in color, too!)

Walter has also produced a phenomenal number of high-quality PhD's, and a large number of whom have gone on to become professors at major universities.

Already at his time in Freiburg he had – as a research assistant – to supervise Amand Faessler (Tübingen). They gave the first solution of the Bohr collective Hamiltonian putting forward the Rotation-Vibration-Model of nuclei and became close friends for lifetime.

The professors are:

Class of 65: Hartmuth Arenhövel, Mainz; Hans Jürgen Weber, Virginia
Class of 66: Wilhelm Pieper, Giessen-Friedberg
Class of 67: Christian Toepffer, Erlangen-Nürnberg; Werner Scheid, Giessen; Max G. Huber, Bonn (habilitation)
Class of 68: Ulrich Mosel, Giessen
Class of 69: Bernd Fink, Leverkusen; Dieter Drechsel, Mainz (habilitation)
Class of 70: Burkhard Fricke, Kassel; Dietmar Kolb, Kassel; Paul-Gerhard Reinhard, Erlangen-Nürnberg
Class of 71: Adolf Grauel, Paderborn
Class of 72: Karsten Pruess, LBL; Elijah Mshelia, Balewa University, Nigeria
Class of 73: Jochim Maruhn, Frankfurt; Berndt Müller, Duke; Johann Rafelski, Arizona
Class of 77: Volker Oberacker, Vanderbilt; Gerhard Soff, Dresden (†)
Class of 79: Horst Stöcker, Frankfurt
Class of 80: Ulrich Heinz, Ohio; Peter Hess, Autonomous University, Mexico; Michael Soffel, Dresden
Class of 85: Andreas Schäfer, Regensburg
Class of 89: Stefan Schramm, Frankfurt; Günter Plunien, Dresden; Klaus Geiger, BNL (†)
Class of 92: Christoph Hartnack, Nantes
Class of 93: Dirk-Hermann Rischke, Frankfurt
Class of 94: Jürgen Schaffner-Bielich, Frankfurt
Class of 96: Eckart Stein, Maharishi University
Class of 97: Michael Meyer-Hermann, FIAS; Adrian Dumitru, Frankfurt; Steffen-Ashraf Bass, Duke
Class of 98: Markus Bleicher, Frankfurt

The PhD students are:

1965: Hartmut Arenhövel, Hans Jürgen Weber; 1966: Wolfgang Donner, Rainer Ligensa, Wilhelm Pieper; 1967: Christian Toeppfer, Werner Scheid; 1968: Ulrich Mosel; 1969 Peter Antony-Spies, Bernd Fink, Ali Rabie; 1970: Burkhard Fricke, Gotthard Gneuss, Paul-Gerhard Reinhard; 1971: Adolf Grauel, Hartmut Helm, Karl Roos; 1972: Klaus Albrecht, Bernhard Blum, Karsten Pruess, Horst Stock, Elijah Mshelia, Peter Holzer; 1973: Her-

bert Diehl, Hans-Joachim Fink, Jens Grumann, Joachim Maruhn, Berndt Müller, Johann Rafelski; 1974: Axel Kappatsch, Tihomir Morović; 1975: Vida Maruhn, Herbert Ruck; 1976: Olaf Krause, Piet-Tijing Ong, Ulrich Schneider, Monika Sedlmayer, Rolf Sedlmayr; 1977: Volker Oberacker, Viola Ruck, Hans-Joachim Scheefer, Gerhard Soff (†); 1978: Ludwig von Bernus, Gerhard Heiligenthal; 1979: Abdel Razik Degheidy, Jürgen Hofmann, Hans-Jürgen Lustig, Angelika Müller, Horst Stöcker; 1980: Wilfried Betz, Noureldin Elsayed Aly, Ulrich Heinz, Peter O. Hess, Johannes Kirsch, Joachim Reinhardt, Wolfgang Schäfer, Michael Soffel; 1981: Nagwa Abou El Naga, Janette Wasif Gurguis, Heinrich Peitz; 1982: Joseph Hahn, Rainier Könnecke; 1984 Gerd Buchwald, Ferencz Kristinkovics, Udo Müller, Jürgen Theis; 1985: Peter Gärtner, Gerhard Gräbner, Andreas Schäfer, Paul Schlüter, Martin Seiwert (†), David Vasak; 1986: Peter Koch-Steinheimer, Karl-Heinz Wietschorke; 1987: Horst Elsässer, Günter Staadt, Mark Uhlig, Theo de Reuss; 1988: Gerhard Mehler, Tobias Rentzsch, Albrecht Rosenhauer, Artur Thiel, Jürgen Fink; 1989: Michael Rufa, Richard Hermann, Karl Depta, Sefan Schramm, Wolfram Schmidt, Günter Plunien, Klaus Geiger (†), André Paulus; 1990: Walter Ludwig Neise; 1991: Christian Derreth, Stefan Graf, Harold Klein, Bela Waldhauser; 1992: Dirk Troltenier, Thomas Schönfeld, Georg Peilert, Christoph Hartnack; 1993: Jürgen Augustin, Andreas von Keitz, Dirk Hermann Rischke, Dietmar Schnabel, Volker Blum, Oliver Graf, Dieter Neubauer; 1994: Maria Berenguer, Alexander Scherdin, Ulrich Katscher, Christian Hofmann, Jürgen Klenner; 1995: Kordt Griepenkerl, Mario Vodović, Raffaele Mattiello, André Jahns, Bruno Ehrnsperger; 1996: Stefan Michael Schneider, Jens Konopka, Eckart Stein, Luke Winckelmann, Arndt Bischoff; 1997: Michael Meyer-Hermann, Adrian Dumitru, Steffen Ashraf Bass, Christian Spieles; 1998: Panajotis Papazoglou, Klaus-Jürgen Lutz; 1999: Markus Hofmann, Markus Bleicher; 2000: Jörg Brachmann, Sven Soff, Nils Hammon, Ulrich Eichmann; 2001: Lars Gerland; 2002 Thomas Bürvenich, Anto Sulaksono, Henning Weber

Walter is known as an excellent teacher with a strong interest in his students' welfare and scientific development. In 1996, he gathered many of them together for the photo in Fig. 24a in George, South Africa. This was at a meeting celebrating his 60'th birthday. In Fig. 24b, you see a typical lecture to his more senior students.

I honestly do not understand how Walter has had the time to accomplish all that he has done. In addition to his academic achievements, Walter is a committed family man. In Fig. 25 is a picture of his two sons Martin and Carsten.

Walter is in the same class and traditions of academics as that of Goethe:

Goethe's aim was to make life a concrete example of the full range of human potential, and he succeeded as few others did.

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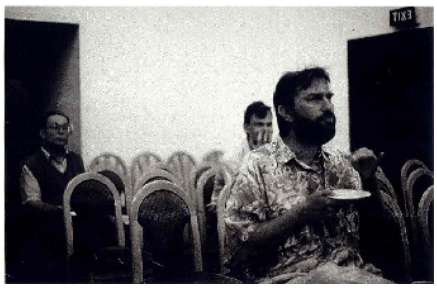
In Fig. 26, Goethe is shown as a young man, and as an old man. He had energy, drive and accomplishment throughout his career.

(a)



(b)

Fig. 24. a Walter and former students in South Africa b Attentive Frankfurt senior students.

Fig. 25. Martin and Carsten in 1996.

6. Poem for Walter

I tried to find a poem which expresses my understanding of Walter's career, but could not find one I thought appropriate. So I decided to write one. I worked hard on it, but wasn't satisfied with the result. I showed it to Alice. A professional writer, she succeeded in giving it proper rhyme and meter while preserving its basic flow of ideas. Here it is, a gift to Walter on this occasion from the two of us.

The Physicist at Seventy
For Walter Greiner

Another morning, and somehow I find
It hard to wake from images that seem
So vivid. Was it really but a dream?
The echoes still resound within my mind.

A painter might have dreamed as I once did

a b

Fig. 26. Portraits of Goethe as a young man and and old man.

When I was young: in flows of hues and forms,
Eager to try new paths beyond stale norms,
I sought to find where truth and beauty hid.

Rare times a phantom stepped to vivid light
And let me capture all its grace. I drew,
To show the world its face. Yes, it was new!
And others nodded, sharing my delight.

Hoping to make a structure that would last,
A kind of architect I next became-
Aware, like all, that nothing man can frame
Remains immutable as years speed past.

I sigh and let myself drift nearer sleep -
Allowing phantoms of a different kind
To pass in sweet succesion through my mind
And promise there are things that man may keep.

I see again the faces we once brought
Into this world - we two, I and my wife....
The faces change, for life gives birth to life;
They blend with those of seekers I have taught.

New comets mount into the sky and shine;
Familiar structures change, and new ones rise -
The dreams survive. They glow in younger eyes.
I recognize those dreams, they still are mine.

7. Acknowledgments

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