Welcome Address

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It is an honor and my great pleasure to be here in Protvino and to open the 13th International Symposium on High Energy Spin Physics. We have held these Symposia every two years since 1974, when Prof. Alan Krisch established the first of these meetings at the Argonne National Laboratory in that year. In the following Table, the year and the venue of the Symposia are listed. As you can see, the Spin Symposia have travelled the world providing the main forum for the exchange of ideas in spin physics and technologies for spin.

Table 1: The International High Energy Spin Physics Symposia

Year	Location	
1974	Argonne	1st International Symposium
1976	Argonne	
1978	Argonne	
1980	Lausanne	
1982	Brookhaven	
1984	Marseille	
1986	Protvino	
1988	Minneapolis	
1990	Bonn	
1992	Nagoya	
1994	Bloomington	
1996	Amsterdam	
1998	Protvino	13th International Symposium

Since the early 1980's there has been a remarkable migration of the Symposia that I would like to show to you. In Figure 1, the location and the year of these Symposia are shown. They are connected by lines and arrows indicating how we have moved from one venue to the next. Close inspection of this map shows a definite pattern of a clockwise rotation around the pole.

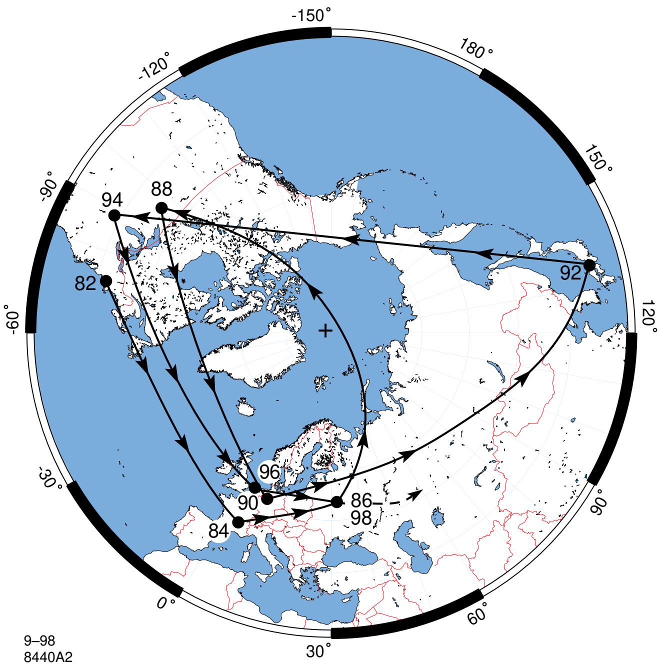

Figure 1: Migration of the Spin Symposia

I find it highly appropriate that our Symposia have naturally established a definite right-handed rotation about the world axis! What else would one expect of the Spin Symposia?

In the next few minutes, I would like to say a little bit about our past, present, and mostly the future.

We have much to learn before we understand the way nature works and the role SPIN plays in nature.

I believe that there will be rapid progress in the understanding. Take the case of the time-honored force of GRAVITY. General Relativity has been a fundamental part of physics since 1915. Today we are on the threshold of launching a set of gyroscopes into earth orbit to test a fundamental prediction of classical General Relativity, a phenomenon called "frame-dragging".

The space-time manifold itself is distorted (twisted) in the field of a rotating massive body (such as the earth). Gyroscopes will be sent into earth orbit to measure this distortion. They should exhibit a small "anomalous"

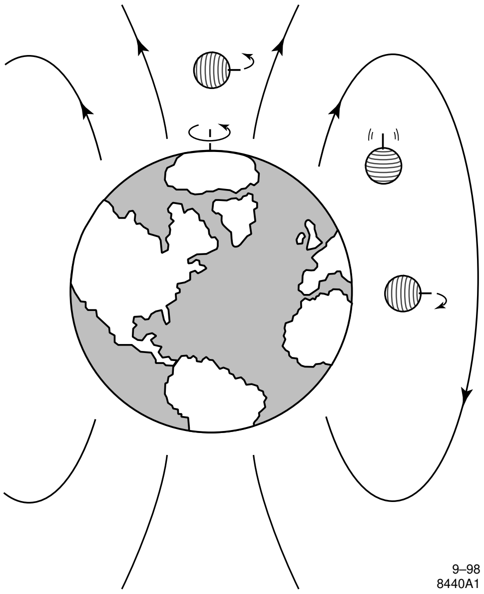

Figure 2: Gravity Probe B will place gyroscopes in earth orbit to test General Relativity (see http://einstein.stanford.edu/)

rotation relative to the fixed stars. GRAVITY PROBE B is a NASA science satellite scheduled to be launched in March 2000. It is designed to measure the predicted gyroscope rotation of 42 milli-arcseconds per year to an accuracy of 1%. Confirmation of this prediction of General Relativity is still important experimentally, and gives us a better understanding of dynamics of matter in the neighborhood of rapidly rotating neutron stars and black holes that we see in the cosmos. (For more information on Gravity Probe B, you might visit the Web site, http://einstein.stanford.edu/)

Even in classical physics, SPIN is playing a modern role.

Particle physicists think of gravity as a fourth force. We ascribe to gravity a quantum, the graviton, that is massless and carries intrinsic spin 2. The Standard Model unifies the other three forces, but how gravity fits into the scheme of the other forces is still a puzzle.

Today there is a new revolution underway in particle physics. It is led by a small band of theorists, somewhat formal, mostly mathematical, and definitely disconnected from the mainstream of particle physics. They call this revolution STRING THEORY. All experimenters and most theorists are merely spectators to this revolution. Yet theorists today tell us that "All paths lead to string theory". They point to the recent "duality" discoveries among the several versions of string theory. These are hints of a deeper connection.

Gravity is naturally incorporated within the string theory framework. String theory is not yet a proven success, but it is on the path of the Holy Grail of physics, the unification of the forces.

The answers to the questions of the origins of intrinsic spin and the asymmetry between left-handed and right-handed fermions *may* lie within the string theory framework. There are even hints of experimental consequences. For example SUPERSYMMETRY, or SUSY, can be incorporated into the framework, and may even be observed within the foreseeable future at our accelerators. Should SUSY, or something like SUSY, be the reality, then spin variables will be the experimental path to the truth. SPIN will be one of the most important experimental tools in unravelling the dynamics of the physics beyond the Standard Model.

Spin physics has a great role to play in the story ahead, and I look forward to future Spin Symposia as that story unravels.

Today we have gathered to enjoy the progress we have made to the present.

Welcome to SPIN98