

The POLGRAW group

- Polish Academy of Sciences
- University of Warsaw
- Nicolaus Copernicus University, Toruń
- University of Białystok

POLGRAW group composition and commitments

Name	FTE	Author	Student	Main activities and FTE
<u>Kazimierz Borkowski</u>	10% (U)	No	No	DA (10%) CW group
<u>Robert Budzyński</u>	60% (U)	Yes	No	DA (60%) CW group
<u>Tomasz Bulik</u>	40% (U)	Yes	No	DA (40%) CB group
<u>Piotr Jaranowski</u>	60% (U)	Yes	No	DA (30%) CW group DA (30%) CB group
<u>Witold Kondracki</u>	50%	Yes	No	DA (50%) CW group
<u>Andrzej Królak</u>	70%	Yes	No	V (20%) Group leader DA (10%) Monitoring tools for periodic signals DA (40%) CW group
<u>Maciej Pietka</u>	50% (U)	Yes	No	V (20%) Simulating VIRGO performance DA (30%) CW group
<u>Andrzej Pisarski</u>	70% (U)	Yes	No	DA (35%) CW group DA (35%) CB group

POLGRAW background

Most of us come from the Faculty of Physics at the University of Warsaw, with a long tradition in research in theory of relativity:

Infeld (Einstein collaborator) and Plebański – equations of motion in general relativity;
Trautman – first non trivial solution of spherical gravitational wave; Paczyński – influence of gravitational waves on binary evolution

POLGRAW achievements

Chirp detection with a network of detectors
Jaranowski, Królak, Phys Rev D (1994)

Derivation of the F-statistics
Jaranowski, Królak, Shutz, Phys. Rev D (1998)

Star Track population synthesis code
Belczyński, Kalogera, Bulik, Ap. J. (2002)

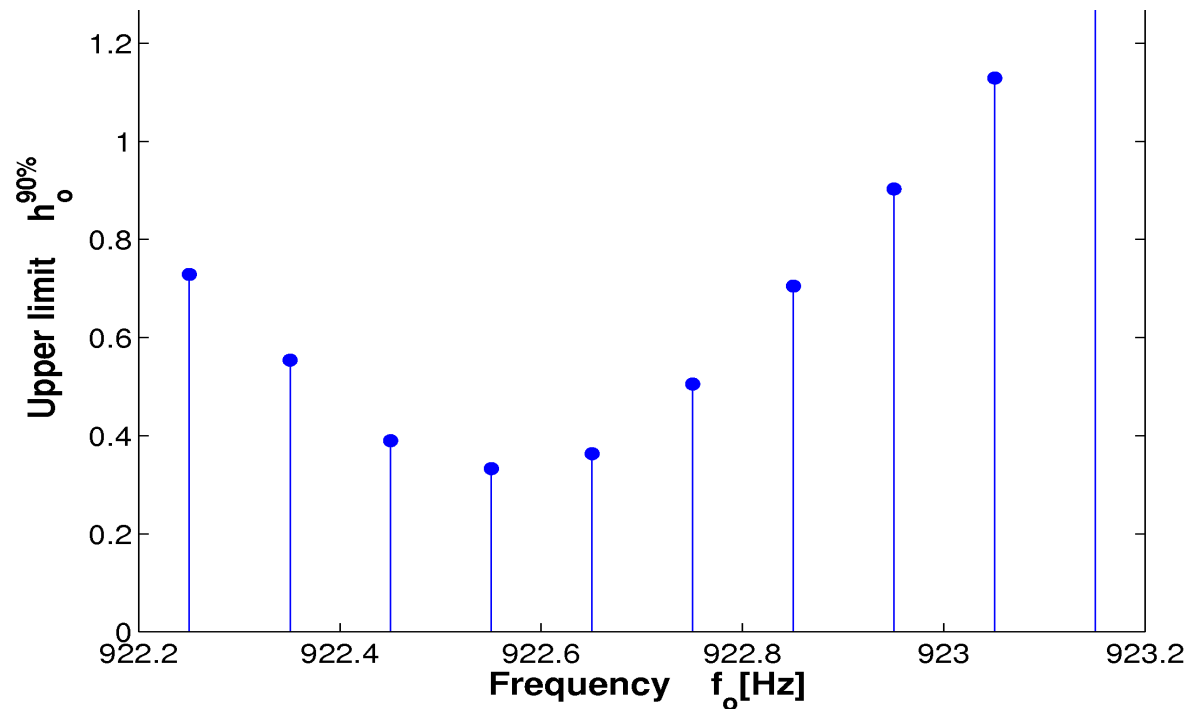
Derivation of the 3-rd post Newtonian 2-body hamiltonian
Damout, Jaranowski, Shaefer, Phys Lett B (2001)

Gravitational wave data analysis

EXPLORER bar detector 3x 2 days

The main outcome of our analysis is an upper limit of 1×10^{-22} for the dimensionless amplitude of a continuous gravitational-wave signal. The upper limit is for any source location in the sky, any polarization of the wave and for signals of frequency from 921.00 Hz to 921.76 Hz and with spin down from $-2.36 \times 10^{-8} \text{ Hz s}^{-1}$ to $+2.36 \times 10^{-8} \text{ Hz s}^{-1}$.

NAUTILUS bar detector 93x2 days



Experience in large projects



Tomasz Bulik –
HESS - a Cherenkov telescope in Namibia

Kazimierz Borkowski
Toruń 32 radio radio telescope, part of VLBI

Proposed POLGRAW contributions to VIRGO

Data analysis

Participation in the all sky search for GWs emitted by rotating NS
CW working group

Modeling populations and searching for GWs from coalescing NS
and Bhs including BH binaries with non negligible spins

Detector characterization

Search for periodic interferences in the data

**Contribute to code simulating working and performance of the
VIRGO detector**

Participation in data taking shifts

Infrastructure and hardware construction

- Computing resources
 - Several local clusters (180 CPUs), International Cent for Mathematical Modelling (50 CPUs)
- Hardware R&D and construction
 - Cooperation with Cosmic Research Center
- Conference facilities
 - Stefan Banach International Mathematical Center, conference center in Będlewo



Funding prospects

- The main funding agency in Poland is the Ministry for Science and Informatics
- We will apply for:
 - “international collaboration” grant to fund the participation in VIRGO (this may include funding for hardware)
 - Individual grants to support specific projects (Bulik, Królak, Jaranowski)

POLGRAW group

- Expertise in gravitational wave data analysis
- Expertise in modeling gravitational wave sources and signals
- Expertise in parallel computing
- Potential hardware and/or engineering contribution
- Ability to involve young scientists in VIRGO related science