



DarkSUSY 4.2

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Philosophy

- Modular structure
- Library of subroutines and functions
- Fast and accurate
- “Standard” Fortran - works on many platforms
- Flexible
- Version control (subversion) for precise version tagging



Contents

- Generic MSSM, mSUGRA, ...
- Laboratory constraints
- Neutralino relic density
- Direct detection
- Signals in neutrino telescopes
- Gamma ray signals
- Cosmic rays positrons, antiprotons and antideuteron



Relic density

- Accurate relic density (1% for given masses and couplings, tree level)
- Resonances and thresholds included
- Full relativistic treatment
- All sfermion, neutralino and chargino coannihilations



Supersymmetric models

- Input parameters at EW scale (MSSM), or
- Input parameters at GUT scale (mSUGRA)
- Higgs sector with FeynHiggs
- Higgs decay widths from Hdecay
- mSUGRA interfaces: ISASUGRA
- Les Houches Accord 2 currently being implemented



Laboratory constraints

- Superpartner masses
- Higgs masses
- Z width
- ρ parameter
- $b \rightarrow s \gamma$
- Muon $g-2$



Direct detection

- Cross sections on protons and neutrons
- Scattering off specific nuclei, including recoil spectra
- Possibility to change spin-dependent and spin-independent form factors
- Optionally, Drees-Nojiri scattering treatment
- Annual modulation signals
- Choice of halo velocity distributions



Gamma rays

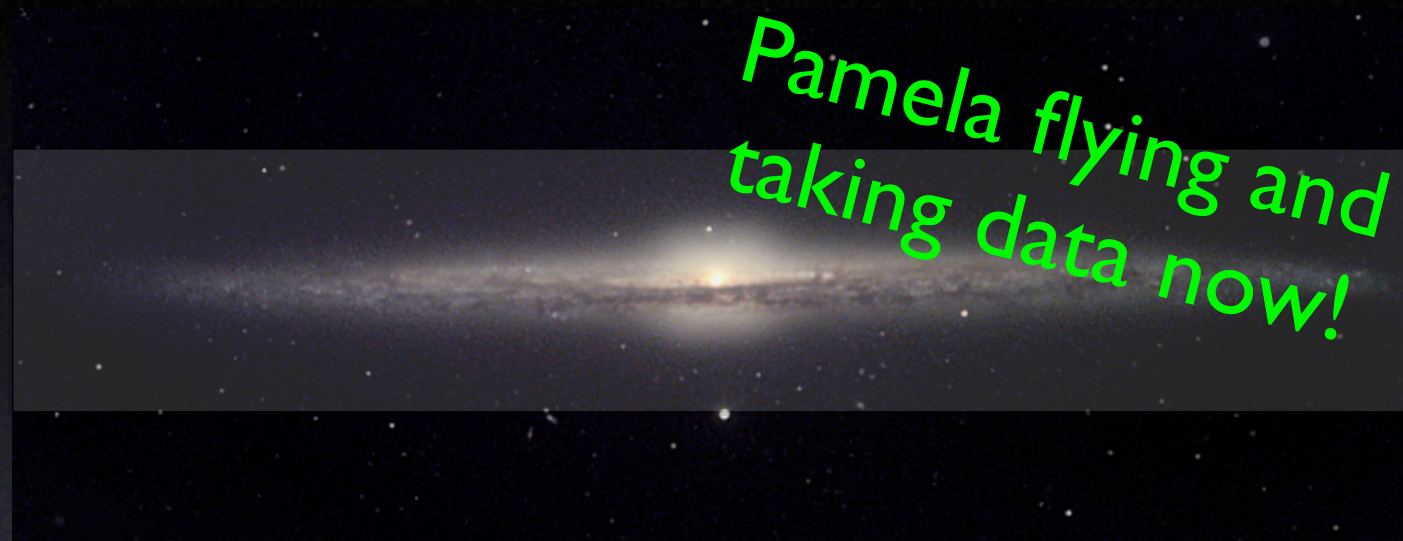
- Continuum emission (from quark jets, π^0 's)
- Line emission ($\gamma\gamma$ and $Z\gamma$)
- Internal bremsstrahlung photons
- Routines to calculate the line of sight integral for different halo profiles

GLAST in orbit
and first survey
run tested!



Charged cosmic rays

- Antiprotons
- Positrons
- Antideuteron
- Diffusion and energy losses included
- Different halo profiles (even clumpy halos)
- Different diffusion treatments, e.g. Moskalenko-Strong Green's functions
- (Very) beta-interface to GALPROP





Neutrinos from Sun/Earth

- Rate of neutrino-induced muons in neutrino telescopes
- Neutrino scattering and absorption in Sun included
- Fully numerical capture calculation with any velocity distribution
- New solar system diffusion yielding depletion of capture by the Earth
- Damour-Krauss population of WIMPs
- Neutrino oscillations, all flavours and hadronic showers



Reference / download

- DarkSUSY 4.1 is available at www.physto.se/~edsjo/darksusy
- Long paper, describing DarkSUSY available as JCAP 06 (2004) 004 [astro-ph/0406204]
- Manual (pdf and html) available

Version 4.2 (or maybe 5...) coming soon!

WimpSim
available now!

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DarkSUSY: computing supersymmetric dark-matter properties numerically

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