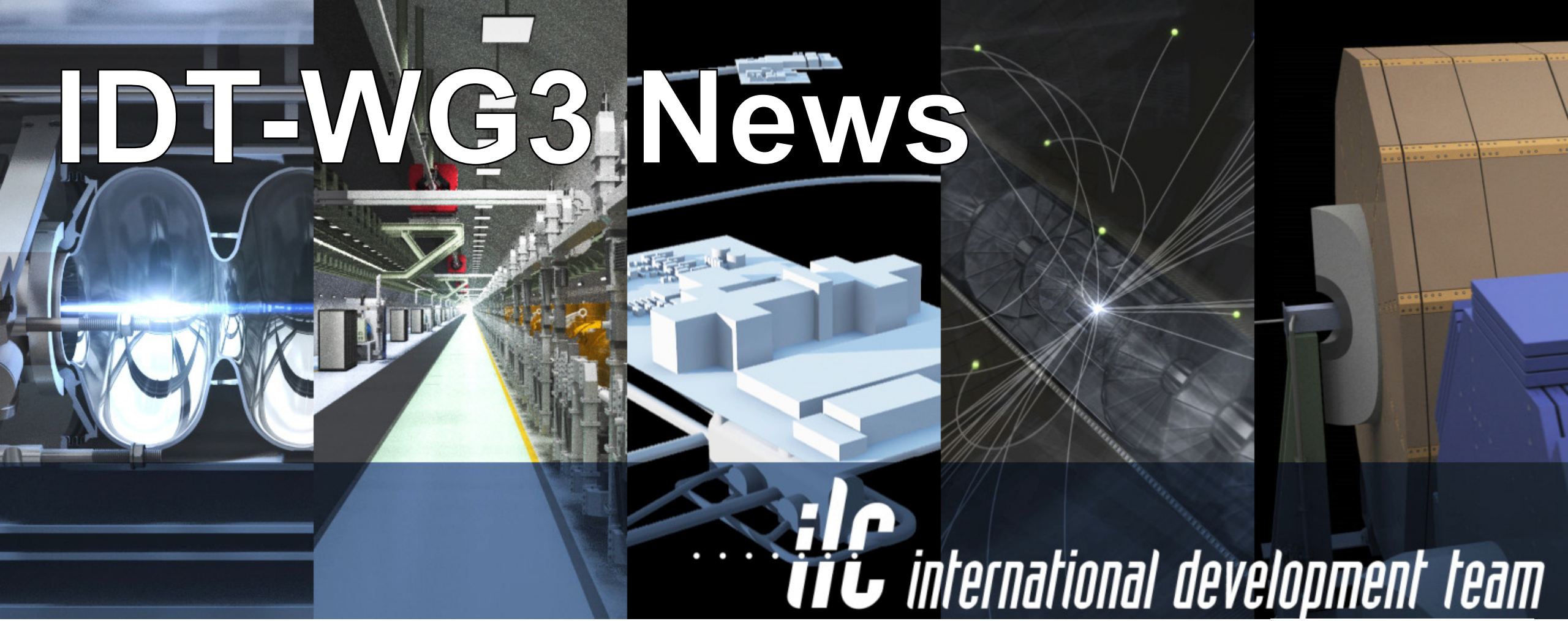
IDT-WG3 News



Jenny List
ILC Europe meeting
28 Sep 2022

Refilling the gaps

Pending official sign-off by EB

- Speakers Bureau: Carsten Hensel (Rio de Janeiro) to replace Alain Bellerive -> SB meets him Thu
- Detector Technology group:
  - US candidate: Jinlong Zhang (ANL) -> Det Tech meets him today
  - Japan candidate: Shinya Narita (Iwate) -> Det Tech meets Oct 7 or 10
- Deputies - past scheme:
  - Hitoshi met ~bi-weekly with deputies, Claude & JL
  - Claude and JL communicated with Detector Technologies, MDI, Software and Physics Opportunities groups
- Future scheme:
  - your friendly WG3 chair would like to keep direct contact with groups :)
  - will nominate one deputy from each of the four groups:
    - Michael Peskin (Physics)
    - Daniel Jeans (Software)
    - Roman Pöschl (MDI)
    - NN (Detector - wait for refilling of group)

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To come over next weeks:
- **re-sharpen mandate / goals / next steps of all groups**
- **re-define outside relationships (ECFA HF, ILC-Japan, C^3)**

Other WG3 news

Physics and events

- **Snowmass:**
  - deadline for final versions of white papers this weekend (Sep 30)
  - Michael Peskin plans to release v3 of the ILC Snowmass Whitepaper soon, probably in ~2 weeks (profiting from being also editor of the over Snowmass proceedings ;-))

  => please look at the current version on overleaf and make sure your topic is up-to-date!
- **WG3 Open Physics meetings:**
  - last one Sep 15: well attended, ~35 people
  - next **Oct 13**, https://agenda.linearcollider.org/event/9682/
    topics (tbc): dark photon searches, top ew couplings, CPV Higgs
- **next LCWS at SLAC**
  - at 99% CL: week of May 15 (incl ascension day May 18)
- **shorter term:**
  - ECFA Higgs Factory WS next week in Hamburg => final slide
  - C^3 meeting Oct 13/14 https://indico.slac.stanford.edu/event/7315/overview
    - Thursday: accelerator R&D plan
    - Friday 9-noon PST: detector session

Picked up at FCCee WS on Polarisation, Energy Calibration and Monochromatisation

Talk by Guy Wilkinson on polarimeter requirements

Any residual longitudinal-polarisation will bias cross sections & forward-backward asymmetries (indeed, high longitudinal polarisation is actually useful, but we assume we are not in that regime – rather longitudinal polarisation is a nuisance).

Consider forward-backward asymmetry of $b\bar{b}$ at *Z* pole: $A_{\mathrm{FB}}^{b} = \frac{3}{4}\mathcal{A}_e\mathcal{A}_b$

where in the SM $\mathcal{A}_e \approx 0.15, \quad \mathcal{A}_b \approx 0.95 \Longrightarrow A_{\mathrm{FB}}^{b} \approx 0.11$

Now, if there is longitudinal polarisation, asymmetry becomes: $\left(A_{\mathrm{FB}}^{b}\right)' = \frac{3}{4}\mathcal{A}_e'\mathcal{A}_b$

where $\mathcal{A}_e' = -\left(\frac{\mathcal{A}_e - P}{1 - \mathcal{A}_e P}\right)$ with $P = \frac{(P_z)_{e^-} - (P_z)_{e^+}}{1 - (P_z)_{e^-}(P_z)_{e^+}}$

and $(P_z)_{e^\pm}$ the longitudinal polarisation of the $e^\pm$.

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Consider forwa

where in the S

Now, if there is

where $\mathcal{A}_e' = -$

and $(P_z)_{e^\pm}$ the

So, if $(P_z)_{e^-} = (P_z)_{e^+}$ (no reason to be so) = 10^{-5} (ballpark guess)

$$P = 2 \times 10^{-5} \implies \frac{(A_{FB}^b)' - A_{FB}^b}{A_{FB}^b} = 1.3 \times 10^{-4}$$

Statistical uncertainty on A_{FB}^b around 2 x 10^{-5} (relative), and QCD uncertainty which will probably be larger. Still, to be safe we would want to control P_Z to < 10^{-5}.

How is this to be done ? Measurements must be made on colliding bunches, where scattering rates are lower. Can we sample all bunches ? Will it prove necessary to depolarise the physics bunches ? If so, we will still need to monitor residual effects.

Note also, that calculations required to transport the measurement of 3-vector at polarimeter to P_Z value at the interaction points. How can this be cross checked ?

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=> limitations from residual polarisation of nominally unpolarised beam is something we've been pointing out since several years (cf PhD thesis Robert Karl, Jakob Beyer)

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ECFA Higgs Factory Workshop

Reminder

- next week at DESY Oct 5-7
- https://indico.desy.de/event/33640/
- mainly in-person, but zoom connection will be provided - as well as recordings

I'm really looking forward to seeing at least some of you again in person, after a looong time!!!