



### BSM physics at the International Linear Collider

The International Linear Collider (ILC) & International Large Detector (ILD)

ILC: Optimized for Particle Flow, Compact, i.e. simple particle reconstruction. Hermetic, extended coverage. High energy, high luminosity.

ILD: Fully-graded, compact and hermetic calorimetry systems.

#### Gauge-Higgs Unification Model (GHU)

In GHU the Higgs boson is the fourth state of the fifth dimensional component of a gauge boson in the bulk of a 5-dimensional spacetime. In this case, the gauge group is SU(3)<sub>C</sub> × SU(2)<sub>L</sub> × U(1)<sub>Y</sub>. Other physical boundary conditions and requirement of anomaly cancellation are imposed through the consistent reduction and the resulting phenomenological boundary conditions.

The  $\beta$ -function is given by:

$$\beta_g = -\frac{g^3}{16\pi^2} \left( \frac{11}{3} C_2(G) - \frac{4}{3} \sum_f T(R_f) - \frac{1}{3} \sum_s T(R_s) \right)$$

where  $C_2(G)$  is the quadratic Casimir of the gauge group,  $T(R_f)$  and  $T(R_s)$  are the Dynkin indices of the fermion and scalar representations, respectively.

#### Signal preselection and quark-tagging

QCD analysis of  $B \rightarrow K^* \mu^+ \mu^-$  ( $B \rightarrow K^* \mu^+ \mu^-$ )

Quark tagging and jet charge measurements.

#### Experimental prospects for GHU

GHU predicts the following observables for the Higgs boson production and decay:

- $\sigma_{\text{had}}(e^+e^- \rightarrow H)$
- $\sigma_{\text{had}}(H \rightarrow e^+e^-)$
- $\sigma_{\text{had}}(H \rightarrow \mu^+\mu^-)$
- $\sigma_{\text{had}}(H \rightarrow \tau^+\tau^-)$
- $\sigma_{\text{had}}(H \rightarrow b\bar{b})$
- $\sigma_{\text{had}}(H \rightarrow c\bar{c})$
- $\sigma_{\text{had}}(H \rightarrow s\bar{s})$
- $\sigma_{\text{had}}(H \rightarrow d\bar{d})$
- $\sigma_{\text{had}}(H \rightarrow u\bar{u})$
- $\sigma_{\text{had}}(H \rightarrow \text{gluons})$
- $\sigma_{\text{had}}(H \rightarrow \text{neutrinos})$

ILC, iLC, UNIVERSITAT DE VALÈNCIA, CSIC, AITANA, ILC

