



Contribution ID: 62

Type: Oral presentation using Zoom

## Prospects of charged Higgs in two Higgs doublet model at the LHC

Thursday, 28 October 2021 20:00 (20 minutes)

Extension of the Higgs sector is ubiquitous in physics beyond the Standard Model (BSM), and the two Higgs Doublet Model (2HDM) is one of the simplest extensions containing two scalar doublets instead of one for electroweak symmetry breaking. In the first half of the talk, I will discuss the exclusion limits on the charged Higgs parameter space,  $m_{H^\pm} - \tan\beta$ , using the CMS results on the upper limits on  $\sigma_{H^\pm} \text{BR}(H^\pm \rightarrow \tau^\pm \nu)$  and  $\sigma_{H^\pm} \text{BR}(H^\pm \rightarrow t\bar{b})$  for  $\sqrt{s} = 13$  TeV at an integrated luminosity of  $35.9 \text{ fb}^{-1}$ . The exclusions obtained at 13 TeV will be compared to the earlier 8 TeV results. The CMS collaboration also studied the exotic bosonic decay  $H^\pm \rightarrow W^\pm A$  and  $A \rightarrow \mu^+ \mu^-$  for the first time and put upper limits on the  $\text{BR}(t \rightarrow H^\pm b)$  for light charged Higgs. These constraints lead to exclusion of parameter space which are not excluded by the  $\tau\nu$  channel. In the second half, I will talk about the prospect of looking for a fermiophobic charged Higgs via the same sign trilepton signal at the LHC. Such a fermiophobic scenario appears in Type I 2HDM where the fermionic couplings of the charged Higgs are inversely proportional to  $\tan\beta$ . For a fermiophobic case, the electroweak production of charged Higgs is dominant for large  $\tan\beta$  and the subsequent bosonic decay of the charged and neutral Higgs will give rise to the same sign trilepton signal which can be an excellent complementary search to explore the large  $\tan\beta$  regions.

### 1st preferred time slot for your oral presentation

15:30-17:30 JST (8:30-10:30 CEST, 2:30-4:30 EDT, 23:30-1:30 PDT)

### 2nd preferred time slot for your oral presentation

19:00-21:00 JST (12:00-14:00 CEST, 6:00-8:00 EDT, 3:00-5:00 PDT)

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**Session Classification:** F-4: Higgs properties

**Track Classification:** Parallel sessions: Topical Groups: Session F: Higgs properties