Background and Aims: This study is part of the Swiss Cohort Study on Air Pollution and Lung and Heart Diseases in Adults (SAPALDIA), a nearly 20-year old cohort study spread in 8 geographically diverse areas in Switzerland. Innovative exposure modeling has been conducted in SAPALDIA earlier for PM$_{10}$ and NO$_2$, however, exposure to specific traffic related pollutants such as ultrafine particles and PM constituents has not been assessed. The overarching aim is to provide the estimates of individual long-term outdoor traffic-related air pollution exposures of the cohort participants. This paper focuses on the spatial and temporal variation of home outdoor particle number concentration (PN) in one of the SAPALDIA area, Basel.

Methods: The PN measurements will be conducted at 20 residences each in four of the eight areas in three seasons over a period of 2 years, 2011-2012. Indoors and outdoors monitoring will be conducted biweekly for PM$_{2.5}$, PM$_{10}$, NO$_2$ and weekly for PN. Particle counts are measured using a particle counting device, miniDiSC (miniature diffusion size classifier). It is a portable device and measures nanometer sized (10-300nm) particles with a resolution of one second.

Results: Mean weekly averaged PN levels are observed 14529±3296, 13659±1878 and 11545 particles/cm$^3$ at street, urban and regional background locations respectively. Median correlation coefficient for all sites is 0.70 (range 0.36-0.91) and 0.83 (range 0.39-0.99) for hourly and daily PN respectively. Median coefficient of divergence, a measure of spatial heterogeneity, for all site pairs is 0.15 (range 0.05-0.27), showing a low to mid spatial heterogeneity in daily PN in Basel. These winter season observations will be compared across seasons and further with concurrent PM$_{2.5}$, PM$_{10}$ and NO$_2$ measurements.

Conclusions: Our first results show significant differences in PN levels in home outdoor locations and document the differential impact of traffic on PN levels in the city.